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ABSTRACT

This guide focuses on the Square One TV game shows, which explore areas ranging from probability and statistics to geometry. Eight game shows are described including the game rules, materials, directions, strategies for playing the games, actual game questions, and reproducible student pages. Follow-up activities provide ideas for using the games on a continuing basis. Also included are curriculum goals for Square One TV. Topics covered include place value, probability, multiplication, strategic thinking, addition, geometry, percentages, estimation, mathematical operations, cubed numbers, and mathematical misconceptions. (KR)

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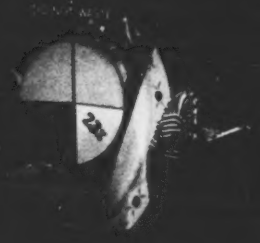

Television

GAME SHOWS

SE051 870

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Television

GAME SHOWS

INTRODUCTION

ABOUT SQUARE ONE TV

SQUARE ONE TV is a unique television series about mathematics, produced by the Children's Television Workshop (CTW), creators of SESAME STREET, THE ELECTRIC COMPANY, and 3-2-1 CONTACT. The first thing you should know about SQUARE ONE TV is that WE WANT YOU TO COPY OR VIDEOTAPE IT OFF THE AIR, AND USE IT IN THE CLASSROOM. It's perfectly legal, as long as you erase the tapes within three years. SQUARE ONE TV airs Monday through Friday on most member stations of the Public Broadcasting Service (PBS). It's aimed at the nation's fourteen million eight- to twelve-year-olds. Each half-hour show includes several segments, many of which parody familiar television formats, such as game shows, sit-coms, cartoons, music videos, and commercials.

In its recently published "Curriculum and Evaluation Standards for School Mathematics" the National Council of Teachers of Mathematics outlines its recommendations for the future of mathematics education. The NCTM document expresses overarching concerns with mathematics as reasoning, problem solving, and communication. SQUARE ONE TV shares these concerns, as demonstrated by its curriculum goals and its overall approach to mathematics education. You can use SQUARE ONE TV and the activities in this teacher's guide to support the NCTM's approach and to develop several of the specific content areas recommended in the Standards.

USING THE TEACHER'S GUIDE

This teacher's guide focuses on the game shows, which are an important part of SQUARE ONE TV. Each game format explores one or more mathematical content areas. Just as the games were designed for a broad spectrum of viewers, the teacher's guide provides a range of activities that we hope will be suitable in a variety of circumstances.

The guide devotes two pages to each of the game formats. In the sections titled "In Brief," you'll find short introductions to help you tell at a glance which games are suitable for the subjects you're working on with your class. The "Game Rules" will give you an idea not only of how the games are played on TV, but also of how you can play them in class.* Each "Step-by-Step Activity" is accompanied by a reproducible student page, which can be used as the basis for a class-length activity. Feel free to copy these pages or any other material in the guide for your own in-school use. Follow-up activities are also included to provide ideas for using the games on a continuing basis. Also included in the guide is a pull-out program listing. This insert contains segment-by-segment rundowns of each program, along with curriculum goals for each segment (see SQUARE ONE TV Curriculum Goals on pages 21–22).

USING THE GAME SHOWS IN THE CLASSROOM

SQUARE ONE TV was primarily designed for home viewing; still, many teachers find it suitable for the classroom. The key to in-class use of the series is selecting material that best matches your curricular goals. Most often, this involves the use of segments rather than entire thirty-minute programs. The following suggestions are intended to help you make the most of the game shows and other segments of SQUARE ONE TV in your class.

1. Try to tape as many of the SQUARE ONE TV programs off the air as you can. This will give you the broadest possible selection of game shows to choose from.
2. Be sure you preview the program, familiarize yourself with the game rules, and review the printed materials before using the games in class. You may also want to encourage students to watch a whole show at home, so they'll be familiar with its spirit.
3. When using one of the game shows, we suggest you:
   - Prepare a few questions to help focus students' attention prior to viewing
   - Show an entire game show once or twice to familiarize students with the games
   - Review the rules prior to in-class game play
   - Follow up watching and playing the games with the related activities and extensions provided
4. The SQUARE ONE TV game shows can make excellent ongoing activities for your class. Once the class has mastered a game, challenge another class to a match, or move on to another game for more fun.

*As you become familiar with the game rules for each show you'll find that there are variations on how to play some of the games. In "Close Call" and "Square One Squares" we've described alternates for you. Discover other possibilities by tuning in for shows 301-340.

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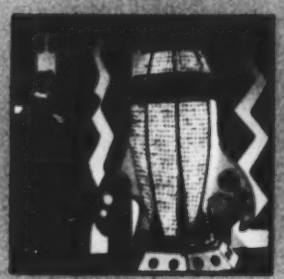

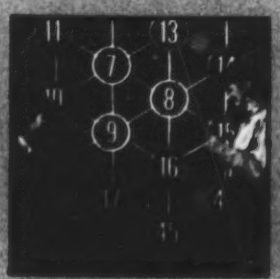

Present funders of SQUARE ONE TV include the National Science Foundation, the Corporation for Public Broadcasting, the U.S. Department of Education, and the Carnegie Corporation of New York. Earlier seasons were also funded by the Andrew W. Mellon Foundation and IBM.

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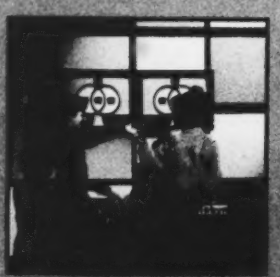


BUT WHO'S COUNTING?

IN BRIEF:

The games are fast, the contestants wild—but as you watch "But Who's Counting?" you'll see that it's no ordinary game show. It turns place value and probability into a battle of wits. And it's a perfect way to explore strategic thinking with your class.

GAME RULES:

Ready to play? Your host, Monte Carlo, and his assistant, Amber Jeanette, will show you how. It's a snap...or a spin! By turning the game wheel, Amber generates random single-digit numbers. You decide where on the game board to put each number—in the ones', tens', hundreds', thousands', or ten thousands' place. But beware! Once your decision is made, it can't be changed.

What's the objective? It's your choice. Here are some used in the shows: make the largest five-digit number; the smallest five-digit number; the largest sum of two three-digit numbers. You can use these to play the game, or you can make up your own. Whoever comes closest to the best possible answer wins.

It's TV's greatest mathematical game of chance—and skill. That's two games in one...or three...or more! But who's counting?

STEP-BY-STEP ACTIVITY:

The strategic thinking used in "But Who's Counting?" can enrich your class's understanding of place value and probability. As a warm-up, have them watch show 106, 134, or 138 (making the largest five-digit number). Then try the activity below.

What you need: a copy of the game wheel from the show, or a set of index cards numbered 0-9, for generating random digits.

What to do: **1.** Try a couple of rounds of "But Who's Counting?" with your class; as your objective, find the largest five-digit number. Once students have gotten the hang of it, discuss strategies. Suppose, for example, you get an 8 on the first spin. Should you put it in the ten thousands' place, figuring you probably won't get a 9 in any of your next four spins? Or should you put it in the thousands' place—and hope for a 9 on one of your remaining spins?

2. To help students develop their strategic thinking, start with a simpler problem. What strategy should they use to make the largest two-digit number? Here are two possibilities:

STRATEGY A: If the first digit is 5 or more, put it in the tens' place. Otherwise put it in the ones' place.

STRATEGY B: Whatever the first digit is, always put it in the tens' place.

3. Is one strategy better than the other? Test them out. Distribute copies of the activity page and try the following sets of spins:

- 2 and then 7
- 4 and then 1
- 7 and then 2

Students will see that sometimes strategy A wins, sometimes B wins—and sometimes the two strategies tie. What about:

- 8 and then 9
- 2 and then 3
- 2 and then 1

4. Have the class fill in all the blanks on the activity page. What patterns emerge? Which is the better strategy overall?

Follow-up: Think about a third strategy: If the first spin is 4 or more, put it in the tens' place; otherwise put it in the ones' place. Does that work better than strategy A? What would be a good strategy if you were playing with only even numbers? What would be a good strategy if you were trying to make the largest *three*-digit number?

NAME: _____

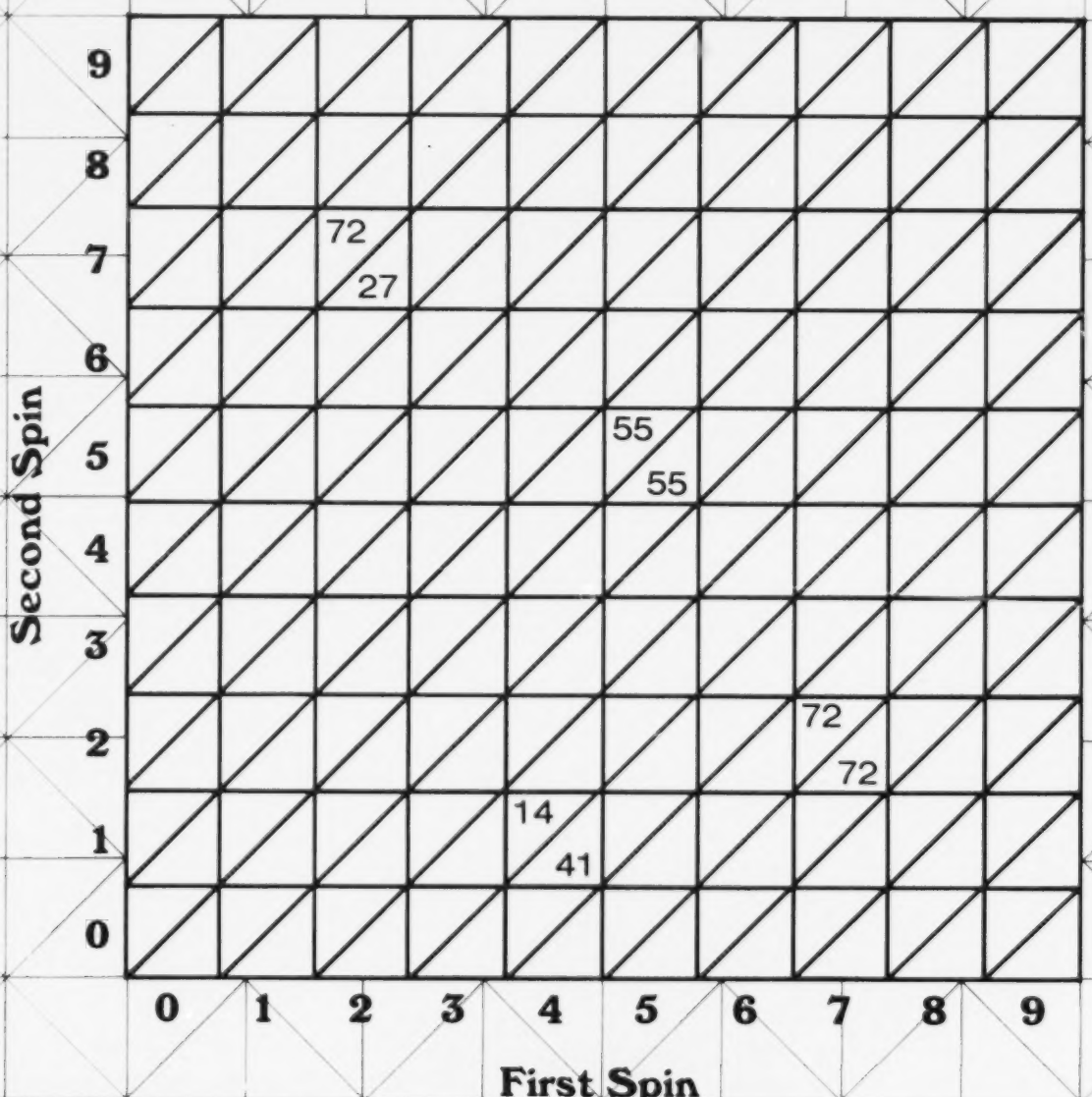
DATE: _____

BUT WHO'S COUNTING?

Strategy A: If the first digit is 5 or more, put it in the tens' place. Otherwise put it in the ones' place.

A / B

Strategy B: Always put the first digit in the tens' place.



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IN BRIEF:

This fast-paced game delivers a double helping of mathematics. For some students, it's an excellent source of practice in multiplication—and for others, it's a challenging exercise in strategic thinking.

STEP-BY-STEP ACTIVITY:

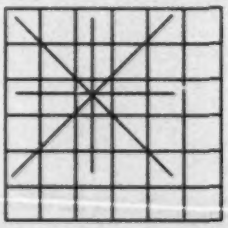
It's not always easy to see what strategies the players are using on "But Who's Multiplying?"—but the following activity will convince your students that there's more to this game than just knowing the multiplication tables. In this activity, we have explored only one of the many possible strategies. Examine the game further with your class, and see what other possibilities there are.

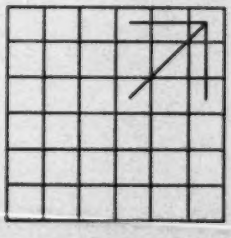
What you need: copies of the activity page, colored checkers or markers. It may also help to have an overhead transparency of the game board.

What to do: **1.** Watch a couple of games of "But Who's Multiplying?" with your class. Then distribute the activity page.

2. Have the class examine the game board. Certain numbers—for example, 11 and 13—are left out. Why? Is it only primes that are missing? Does the game board contain any primes at all? Why do you think the game board is designed this way?

3. Try a sample game (forget about the time limit for now). Suppose that Red goes first and plays the red factor ring on 2 and the blue factor ring on 9. How many possible three-in-a-rows are there that include the product 18? Why might this be a better move than red ring on 2 and blue ring on 3? To help students visualize this problem, have them consider the geometry of the game board. A blank grid like those below will help them see that squares near the center of the game board have many more possible three-in-a-rows than squares near the edges.





4. Have the class consider every square on the game board. In each one they should record the number of three-in-a-rows that include that square. What patterns emerge? What strategies does this pattern suggest—are there some squares that seem to be better plays than others?

Follow-up: Consider the strategy suggested by the main activity. If Red goes first and puts the red ring on 5 and the blue ring on 4, what would be a good response for Blue? Why might blue ring on 1 be a bad idea? Why might blue ring on 8 be better? Why might blue ring on 2 be better still? Don't forget to consider Blue's ability to block Red's potential three-in-a-rows.

NAME: _____

DATE: _____

BUT WHO'S MULTIPLYING?

PRODUCT BOARD

1	2	3	4	5	6
7	8	9	10	12	14
15	16	18	20	21	24
25	27	28	30	32	35
36	40	42	45	48	49
54	56	63	64	72	81

1	2	3	4	5	6	7	8	9

FACTOR BOARD

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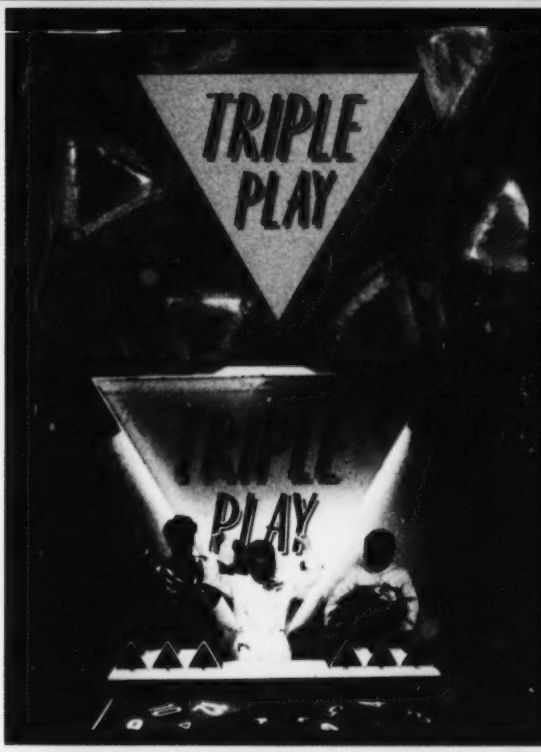
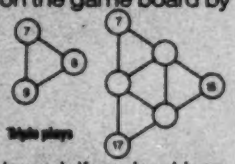


IN BRIEF:

No, it's not baseball—this triple play involves addition, multiplication, and geometry. It's an exciting way to practice basic arithmetic while learning to recognize equilateral triangles. It's also a game of strategy and quick thinking.

GAME RULES:

The object is to make an equilateral triangle on the game board by claiming three numbers that are its vertices. Treat the numbers on the game board as either products or sums. Spin the two game wheels until each one stops at a number. Then either multiply or add the numbers to match a number on the game board. If a wheel happens to stop on a SQUARE ONE TV symbol, you're in luck! Use it to represent any number you want. Call out the product or sum of the numbers you've spun, and claim the matching number on the game board. Whoever makes an equilateral triangle* on the game board first—and shouts "Triple Play!"—wins. With "Triple Play," your class will have fun *and* see each problem from three angles!



Triple plays

*Note that only triangles whose sides are formed by the lines on the game board are valid.

STEP-BY-STEP ACTIVITY:

"Triple Play" moves very quickly—but understanding the mathematics of the game board will help you make the right moves.

What you need: copies of the activity page, scissors, paste, dice, colored checkers or markers. It may also be helpful to duplicate the master of the game board onto an overhead transparency.

What to do: 1. After viewing "Triple Play," distribute copies of the activity page. In place of the game wheels, let your students construct special "Triple Play" dice by cutting out the numbers and logo on the activity page and pasting them to the faces of two dice. Numbers 1 through 6 should go on one die; numbers 7, 8, 9, 10, 12 and the logo should go on the other. Then let the class play several games of "Triple Play."

2. Look at the game board. Each number on it is a vertex of more than one equilateral triangle. Let your students find the six triangles which have 24 as a vertex. How many triangles have 54 as a vertex? How about 10? Once the class has counted these, ask them which of the three numbers might be the best starting move, and why.

3. Next to each number on the board, let the class record the number of equilateral triangles for which it is a vertex.

4. What patterns do students see in their answers? Is there any symmetry? Why are all the answers down the middle line even numbers?

Follow-up 1: a. Using the strategy suggested by the main activity, can the class locate the **best** starting positions on the board? Are there some they would like to avoid? Why?

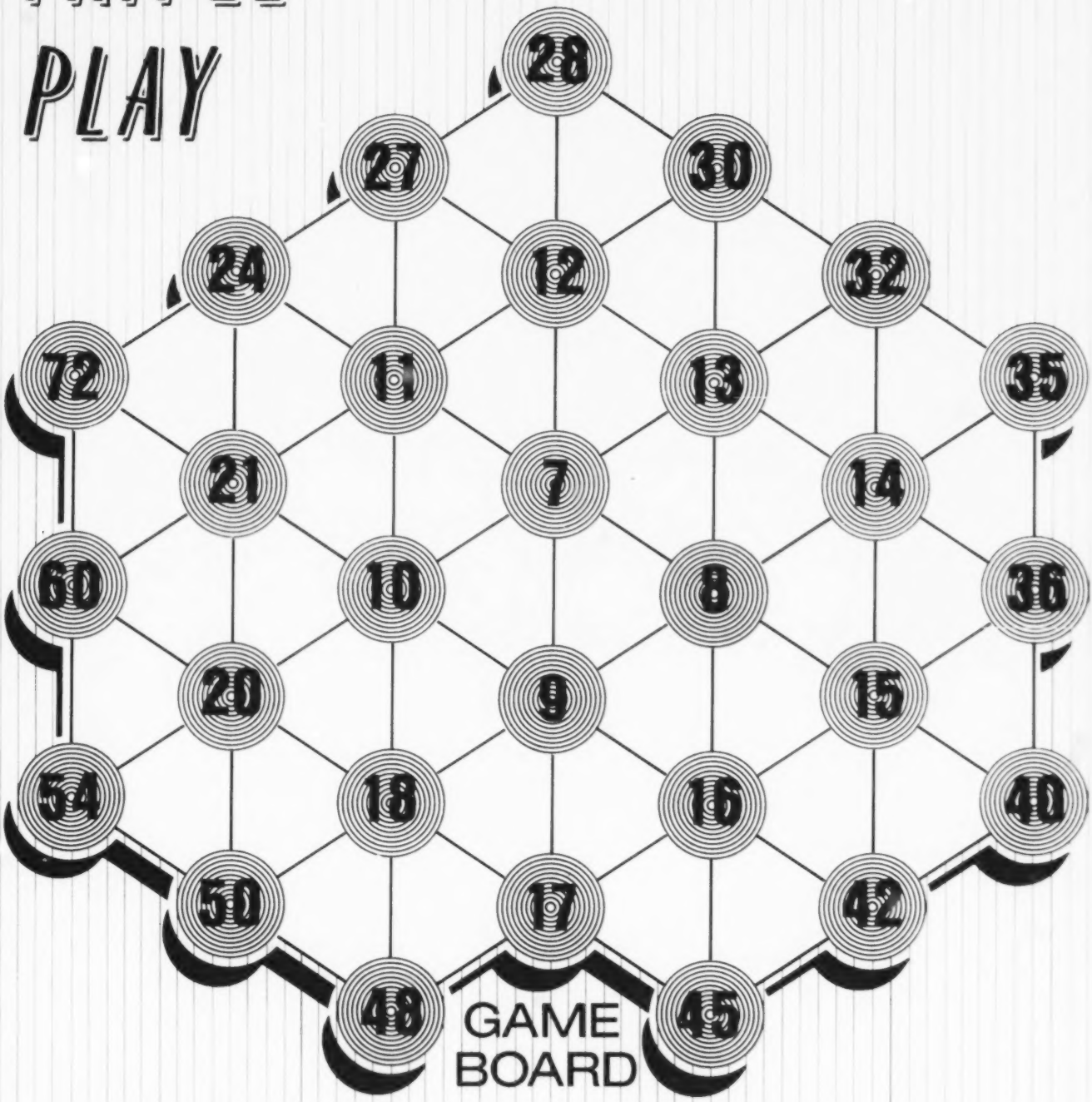
b. Discuss a hypothetical game with the class. You're first. On your first roll, you get 10 and 1. Should you multiply or add? Why might it be better to multiply? Now suppose your opponent rolls 7 and 1. Should he multiply or add? Consider that it might pay for him to try to block one (or more) of your triangles if he can. What if your opponent gets 3 and 8 on his first spin? How about 9 and 4? In each case, discuss (1) the number of **your** triangles that your opponent's move would block, and (2) the number of triangles that would be opened up for your opponent.

Follow-up 2: How many equilateral triangles are there on the whole board? It **isn't** just the sum of all the numbers you found in the first part of the activity!

NAME: _____

DATE: _____

TRIPLE PLAY



GAME BOARD

1	2	3	4	5	6	7	8	9	10	12

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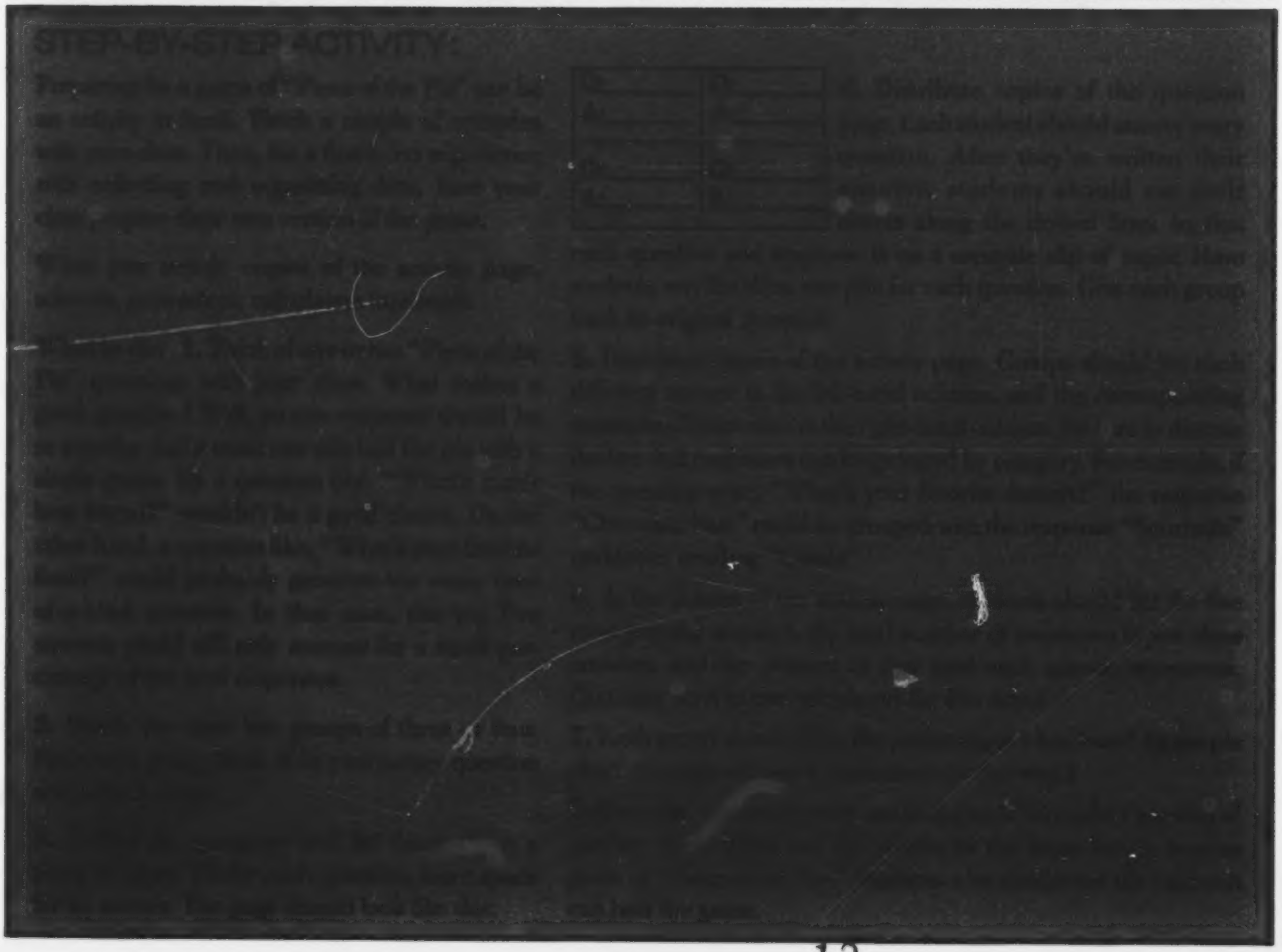
GAME RULES:

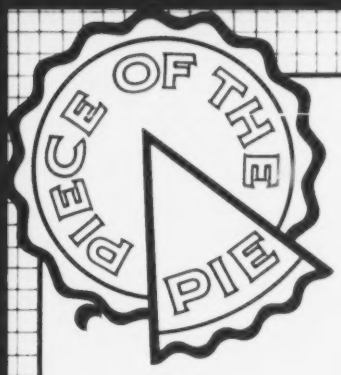
Name your favorite snack. Is it pizza? Ice cream? Raw cauliflower? Think hard before answering, because in this game, only the most popular answers count!

Here's how to play. There are two teams, each with three contestants. At the beginning of the game, the host reads a survey question, like, "Name something you see at a parade." Then, alternating teams, he asks each contestant to guess at the most popular choices made by elementary school students in an actual survey. Each team is allowed a "huddle," in which they can discuss their answer among themselves.

When one of the five top choices* is guessed, the appropriate percentage is displayed on a pie chart. The team that accumulates over fifty percent of the pie is the winner!

*Note that the less popular choices made in the survey are actually discarded. The top five choices serve as the base from which the percentages used in the game are calculated.





GROUP: _____
DATE: _____

QUESTION _____

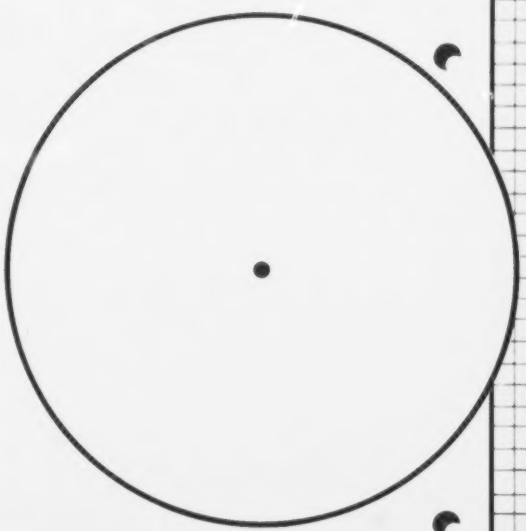
_____

_____

DATA

ANSWERS	NUMBER OF RESPONSES

TOP 5 ANSWERS	NUMBER	% OF TOTAL
1. _____		
2. _____		
3. _____		
4. _____		
5. _____		
	TOTAL:	



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IN BRIEF:

Sometimes in real life things aren't as exact as you want them to be—that's when estimation takes over. And SQUARE ONE TV's game of estimation, "Close Call," provides an entertaining introduction to this critical skill.

GAME RULES:

All eyes are on stage for each exciting episode of "Close Call." The host presents student contestants with a visual estimation task like one of these: How many pieces are in this jigsaw puzzle? How many peanut-butter jars tall is that elephant on stage?

There are three rounds. After they're shown an estimation task and a referent, contestants get ten seconds to make their estimate and write it down. Then they reveal their answers one by one. Whoever makes the closest estimate in each of the first two rounds qualifies for the final championship round.

Once your class understands how the game works, try playing for points: the better the estimate, the higher the score. You can even get the class audience into the act by asking them to vote on how close the contestants' championship estimations come to the real answer. Is there a game show that's faster, wilder, more unpredictable? If there is, it's a close call!

STEP-BY-STEP ACTIVITY:

Watch a few games of "Close Call" and encourage your class to think about how they would make their own estimates. For challenging problems, stop the tape and compare methods. Then try the following activity.

What you need: copies of the activity page.

What to do: 1. Distribute copies of the activity page.

2. Above each figure on the page is an estimation question. Have students answer these, using the referent provided for each estimate. For example, in Activity C, the referent is a line which is 1 cm long. This can be used to estimate that the first section of the curve is 5 or 6 cm long. Since the curve zigzags a total of 16 times, the total length would be about 80 cm.

Encourage your students to make each estimate in a variety of ways and to keep track of their methods. Do different processes lead to different results?

3. Have students articulate the reasoning they use and compare their analyses with one another. Does the class believe that some methods of estimating are better than others? Why?

Follow-up 1: Divide your class into small groups. Each group should create one or more estimation tasks, along with the necessary props. Then they can challenge their classmates to their own game of "Close Call!"

Follow-up 2: Chances to estimate are all around us. Pose a daily or weekly estimation challenge for your class. Here are some examples:

- What is the total area of all the blackboards in the school in square meters?
- How many ceiling tiles are there in all the classrooms in the entire building?
- How much do all the third-graders in the school weigh together?
- How long a piece of rope would be needed to go once around the whole school building?
- How many Ping-Pong balls would fit inside the school auditorium?

PROGRAM GUIDE

This guide is a quick reference to the various segments of the daily shows on SQUARE ONE TV. Two seasons are represented, a total of 115 shows.

To assist you in identifying subject matter that fits with your lessons, each segment description is followed by a content code which is based on the SQUARE ONE TV curriculum goals (see Teacher's Guide contents). You can use this information to integrate segments into your lesson plans. Each segment has also been timed; segment lengths are provided to help you plan your lessons. We encourage you to tape programs or program segments off the air for in-class use. It's perfectly legal, as long as you erase the tapes within three years.

Titles of the Mathnet episodes appear at the end of each show listing. Short pieces such as Warnings and Newsbreaks are not indicated in this guide.

You can also use the program guide to get a sense of a whole show's contents before it is broadcast (broadcast schedules for your area can be obtained from your local PBS station). Each show is identified by a show number noted here. You'll see the number on your TV screen during the opening credits of the program.

SEASON 1

WEEK ONE

Length ▸ Title and Description ▸ Content Areas

SHOW NUMBER 101

3:18 **Infinity:** Graphic suggestions of infinity — D1 B1
1:21 **Mathman:** Multiples of 3 — B2
2:23 **Phoner–The Answer Is 3:** Algorithm that always gives the answer 3 — D2 B1
4:41 **Battle of the Bulge Caterers–Sandwiches:** Combinations from 2 meats and 3 cheeses — E1 D2
1:27 **Oops! Subtraction 300 – 163:** Borrowing mistake in subtraction — A2 B1
3:25 **Perfect Squares:** Square numbers — B2 B1
1:59 **Bureau of Missing Numbers:** Attributes of 14 — B2 B1
8:05 **Mathnet: Problem of the Missing Monkey–1** — C3 D1

SHOW NUMBER 102

7:34 **Star Truck Blandstand:** Average not higher than highest score — F5 F6 F2 B1 B4
2:40 **Rappin' Judge:** Round-trip rate problem — B5 C2 B1
2:04 **Blackstone–Dime, Penny, Nickel:** Trick based on odd and even numbers — B3 B1

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2:34 **Nines:** Song/digits of multiples of 9 add up to 9 — B2 D2 B1
1:27 **The Map:** Estimating time/distance using map scale — G4 C3 B1
9:40 **Mathnet: Problem of the Missing Monkey–2** — G4 C3 B1 E1

SHOW NUMBER 103

2:45 **Spade Parade: In Search of Yucca Puck–1:** Logic problem sorting out truth and lies — E3
1:19 **Mathman:** Decimals less than .5 — A4 D1
2:32 **Spade Parade: In Search of Yucca Puck–2**
2:05 **Less Than Zero:** Negative numbers — A6 D1
5:48 **But Who's Counting?:** Smallest 5-digit number — A2 D1 F4
1:32 **Data Headache II:** Pie chart — F6
1:58 **You Can Count on It:** Mathematics in the world — C1
8:18 **Mathnet: Problem of the Missing Monkey–3** — G4 B5

SHOW NUMBER 104 Major emphasis: Scale

6:25 **Tony and the Togas:** Roman numerals — A2
1:11 **Oops! Ruler:** Mistake in lining up a ruler — C2
4:30 **Wrong Building:** Importance of proper scaling — G4 C2
3:39 **Shoemaker & Elves:** Interpreting scale and ratio — G4 B5 A3
2:29 **Comic–Shrunken Toothbrush:** Confusion of scale — G4 B5
8:17 **Mathnet: Problem of the Missing Monkey–4**

SHOW NUMBER 105 Major emphasis: Percents

3:58 **Prime Time Programming Meeting:** Prime numbers — B2
2:25 **Percents:** Equivalent fractions/decimals/percents — A5 A3 A4
:50 **Soda Shoppe:** Computing a tip and rounding up — A5 A4 B4
1:10 **Trout on Your Head:** Horizontal bar graph — F6 A5
6:54 **But Who's Counting?:** Largest sum of two 3-digit numbers — A2 D1 F4
10:01 **Mathnet: Problem of the Missing Monkey–5**

WEEK TWO

SHOW NUMBER 106 Major emphasis: Angles

6:08 **Robin Hood:** Odd and even numbers — B3 B1
1:45 **Cabot & Marshmallow–Hey Cabot:** Multiplying by zero — B1
1:15 **Person on the Street:** Dodecahedron — G6
:20 **Dance of the Geo Shapes:** Dodecahedron — G6 G1

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5:17	**But Who's Counting?:** Largest 5-digit number	A2 D1 F4
2:23	**Angle Dance:** Body movements illustrate angles	G6
3:00	**Playing the Angle:** Angles and arcs in basketball	G6 F4 C2 A3 A5
:19	**Pong Game:** Billiard geometry	G2 G6
6:27	**Mathnet: Case of the Missing Baseball–1**	G6 G4

SHOW NUMBER 107 Major emphasis: Percents

4:38	**Identity Crisis:** Attributes of zero	A2 A4 B1 D1
2:46	**Lemonade Stand in the Desert:** Percent and decimal relationships	A5 D1 A3
2:47	**Eight Percent of My Love:** Percentages and a pie chart	A5 F6
2:27	**Harry's Hamburger Haven:** Equivalent fractions/decimals/percents	A4 A5 A3
6:20	**Matinee Movie–Cartablanca:** Rounding up weights	B4 B1
1:52	**Yes, General, Sir:** Permutations of 3 items	E1
5:23	**Mathnet: Case of the Missing Baseball–2**	G4

SHOW NUMBER 108 Minor emphasis: Volume

3:38	**Suds–Popcorn:** Doubling dimensions octuples volume	C2 C1 D2
1:38	**Oops! Decimals:** Mistake lining up decimals in addition	A4 B1
2:20	**Cabot & Marshmallow–Wooden Candy Bars:** Different dimensions–same volume	C2 C1
1:56	**Country and Western Music Pitch:** Fractions	A3 D1
3:15	**Tessellations:** Tessellated patterns on the beach	G3 G6
5:33	**But Who's Multiplying?:** Select factors and give products	B1 B2 D1 F4
1:12	**Mathman:** Factors of 18	B2
1:09	**Groaning Wall:** Mathematical riddles	
6:17	**Mathnet: Case of the Missing Baseball–3**	F4 A9

SHOW NUMBER 109 Minor emphasis: Odd and Even Numbers

7:00	**Phoneymooners–Hole in the Wall:** Area of an irregular shape	C2 C1 G4 B1
3:47	**Navigator:** Using maps and tools to chart a course	C2 G4 G6
2:54	**Blackstone–Heads or Tails:** Coin trick involving parity	B3
3:33	**X...It's the Sign of the Times:** Multiplication symbol	B1
1:12	**Mathman:** Odd numbers	B3
7:42	**Mathnet: Case of the Missing Baseball–4**	B4 G4 C3 B5

Length	Title and Description	Content Areas

SHOW NUMBER 110 Major emphasis: Combinatorics

3:10	**Superguy: New Cape Caper–1:** Combinations of 3 belts and 3 capes	E1 D2 B1
1:23	**Dweezil–Combinatorics:** Defining combinatorics	E1
3:40	**Superguy: New Cape Caper–2**	
2:18	**Mistakes:** Learning from mistakes	
2:07	**Building Go Boom:** Calculating height	B1 C1
3:10	**Ice Cream Store–Calories:** Bar chart and percents	A5 A3 D1 F6
2:36	**Me and My Shadow:** Comparing 2 and 3 dimensions	G1 C2
6:41	**Mathnet: Case of the Missing Baseball–5**	G4 G6

WEEK THREE

SHOW NUMBER 111 Major emphasis: Probability

1:41	**Cabot & Marshmallow: Probability–1:** Probability of 1	F1 D1
1:42	**On the Midway:** Unequal probability	F4 F1 A3
2:19	**Cabot & Marshmallow: Probability–2:** Probability of zero	F1
4:20	**Ghost of a Chance:** Probabilities in several situations	F1 F3
4:27	**Handshake Contest:** Triangular numbers	B2 D2 D1
2:02	**Blackstone–Mental Speller:** Trick based on counting letters	D2
9:51	**Mathnet: Problem of the Passing Parade–1**	B4 B1 B5 G4

SHOW NUMBER 112

5:38	**Paper Race:** Rounding up to estimate cost	B4 B1 A4
3:16	**Burger Pattern:** Triangular number pattern	D2 D1 B1
5:48	**But Who's Counting?:** Largest sum of 2- and 3-digit numbers	A2 D1 F4
2:53	**It's a Palindrome:** Generating palindromes	A2
9:07	**Mathnet: Problem of the Passing Parade–2**	C3 G6 G4

SHOW NUMBER 113 Major emphasis: Fractions

1:15	**Groaning Wall:** Mathematical riddles	
3:11	**Samurai Mathematician:** Comparing fractional pieces of board	D1 A3
3:22	**Diet Lite Wet:** Equivalent fractions/decimals/percents	A3 A5 A4
1:24	**Mathman:** Fractions equivalent to 1/3	A3

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2:24 **Action at the Fraction Bar:** Fraction vocabulary — A3 A4 A5
3:45 **Good Sports—Fractional Baseball:** Scoring ¼ for each base — A3 D1 B1
1:50 **Oops! Division 6 into 4212:** Place value mistake in division — A2 B1
10:06 **Mathnet: Problem of the Passing Parade—3** — C2

SHOW NUMBER 114 Major emphasis: Two-Dimensional Shapes

3:33 **Cabot & Marshmallow—What Is a Name:** Rate problem using logic — B4 B5 B1
4:27 **Whither Weather:** Averages — F2 B1 D1
2:32 **Square Song:** Geometric properties of squares — G6
1:27 **Person on the Street:** Rhombus — G6
3:05 **Blackstone—The Imagination Dice:** Algorithm always giving the answer 10 — D2 B3 B1
:24 **Dance of the Geo Shapes:** Cube — G6 G1
3:51 **In Search of the Giant Squid:** Scale on a submarine map — C1 G4
7:21 **Mathnet: Problem of the Passing Parade—4**

SHOW NUMBER 115

5:06 **Daddy Knows Different—Doubling:** Doubling a penny for 30 days — B1 A1 D2
2:27 **Problem Song:** Rate problem peeling apples — B5 A3 B1
1:12 **Tessellation Animation—Tile:** Tessellated pattern on a tile mosaic — G3 G6
6:41 **But Who's Counting?:** Largest sum of 2- and 3-digit numbers — A2 D1 F4
1:10 **Data Headache I:** Bar chart — F6
9:01 **Mathnet: Problem of the Passing Parade—5** — D2 F4

WEEK FOUR

SHOW NUMBER 116 Major emphasis: Spatial Measurement

3:59 **I Love Lupy: Elephants—1:** Estimating room area — C3 C2 G4
1:41 **Frame the Cat:** Smaller units/more accurate measurement — C2 G1 C3
3:58 **I Love Lupy: Elephants—2**
2:58 **Countin' Out the Rhythm:** Counting beats in a musical measure — D2 B1
1:27 **Mathman:** Factors of 12 — B2
3:58 **Blackstone—The Coin Puzzle:** Coin trick based on order and logic — D2
8:35 **Mathnet: Trial of George Frankly—1**

SHOW NUMBER 117 Major emphasis: Area and Perimeter

:27 **Perimeter:** Perimeter of irregular shapes — C2 C1

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1:31 **Oops! Perimeter:** Mistake in calculating perimeter — C2 B1
5:01 **Bandanas:** Area and perimeter of rectangles — C2 G6
2:37 **Math Mimes:** Equal perimeters/different areas — C2
3:50 **Neighborhood Superspy:** Alphanumeric code — D2 D1
:30 **X-Rays:** Geometric shapes describe a sculpture — G6
3:21 **But Who's Adding?:** Select addends and give sums — B1 D1
8:52 **Mathnet: Trial of George Frankly—2** — B4 B5 C2

SHOW NUMBER 118 Major emphasis: Figurate Numbers

3:25 **Perfect Squares:** Square numbers — B2 B1
1:12 **Museum—1:** Painting square numbers — B2 G6
4:38 **Trojan Pie:** Triangular numbers — B2 D2 G6 B1
:57 **Museum—2:** Painting triangular numbers
1:46 **Groaning Wall:** Mathematical riddles
:49 **Museum—3:** Square and triangular numbers
4:35 **But Who's Multiplying?:** Select factors and give products — B1 B2 D1 F4
9:24 **Mathnet: Trial of George Frankly—3** — F4 A2

SHOW NUMBER 119 Major emphasis: Rounding

5:27 **Round Off:** Round to nearest 10, 100, or 1000 — B4 A2
1:21 **Cabot & Marshmallow—Round to Confound:** Inappropriate rounding — B4 B1
3:02 **Round It Off:** Rounding numbers — B4
2:48 **Blackstone—Move the Clip:** Trick using symmetry — G2
:30 **Romance of Geometry:** Two congruent triangles — G6
13:26 **Mathnet: Trail of George Frankly—4** — B1

SHOW NUMBER 120 Major emphasis: Prime Numbers

5:55 **Callous—Candy Box:** Prime number 101; sum of squares — B2 C2 B1
2:16 **Bureau of Missing Numbers:** Attributes of 101 — B2 B1 A1
2:42 **Prime Club:** Prime and nonprime numbers — B2
:55 **Square Dance:** Square number arrays — D2 B2 G6 G2
2:04 **Multiplication Rap:** Importance of multiplication — B2 B1
1:49 **Mathman:** Fractions less than ½ — D1 A3
9:30 **Mathnet: Trial of George Frankly—5** — B5

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WEEK FIVE

SHOW NUMBER 121 Major emphasis: Common Multiples

:11	**Hundred Square:** Common multiple of 15 and 18	B2 D2
5:00	**Clown School Investigation:** Common multiple of 15 and 18	B2 B1
5:32	**But Who's Counting?:** Largest sum of 2- and 3-digit numbers	A2 D1 F4
4:21	**Common-Multiple Man:** Common multiples of 12, 16, and 24	B2
2:05	**Less Than Zero:** Negative numbers	A6 D1
:26	**Pos vs. Neg Jousts–Paratroopers:** Adding positive and negative numbers	A6 B1
2:25	**Ratings War:** Double bar graph	F6 F5
6:35	**Mathnet: Problem of the Dirty Money–1**	

SHOW NUMBER 122

3:56	**Thirty-Two Divided by 5–1:** Arithmetic problem of men in a boat	B1 B4
:24	**Concave/Convex:** Concave and convex shapes	G6
2:02	**Thirty-Two Divided by 5–2:** Arithmetic problem of yards of material	B1 B4
:21	**Concave/Convex:** Concave and convex shapes	G6
2:58	**Thirty-Two Divided by 5–3:** Arithmetic problem of people and a bill	B1 B4 A4
4:00	**Blackstone–Name the Number:** Coin trick based on arithmetic	B3
:35	**Odd and Even Hands:** Odd and even numbers	B3
2:30	**Jenny Didn't Call:** Mathematical pattern of behavior	D2
9:24	**Mathnet: Problem of the Dirty Money–2**	A9 A3 G4 B5

SHOW NUMBER 123 Major emphasis: Area of Irregular Shapes

5:49	**King for a Day:** Dividing a trapezoid	G6
1:17	**Person on the Street:** Trapezoid	G6
2:29	**Trapezoid Monks:** Defining a trapezoid	G6
:58	**Mathman:** Even numbers	B3
2:22	**Daddy Knows Different: Lawn Mowing–1:** Area of irregular shape	C2 C4
3:07	**Roman Numeral Blues:** Roman numerals	A2
3:18	**Daddy Knows Different: Lawn Mowing–2**	
1:50	**Oops! Division 6 into 4212:** Place value mistake in division	A2 B1
6:02	**Mathnet: Problem of the Dirty Money–3**	

SHOW NUMBER 124 Major emphasis: Factors and Primes

1:30	**Mathman:** Prime numbers	B2
:36	**Matinee Movie: Dialing for Factors–1:** Factors of 84	B2 B1
3:02	**Mr. Bland Builds His Dream House–1:** Rectangular window using 17 panes	B2 B1 G6
1:48	**Matinee Movie: Dialing for Factors–2**	
2:23	**Mr. Bland Builds His Dream House–2:** Rectangular window using 15 or 16 panes	
:18	**Matinee Movie: Dialing for Factors–3**	
1:49	**Bureau of Missing Numbers:** Attributes of 9	B2 B3
2:34	**Nines:** Song/digits of multiples of 9 add up to 9	B2 D2 B1
4:39	**But Who's Adding?:** Select addends and give sum	B1 D1
7:56	**Mathnet: Problem of the Dirty Money–4**	

SHOW NUMBER 125 Minor emphasis: Multiples

4:31	**Amazing Story of 9s–1:** Digits of multiples of 9 add up to 9	B2 D2 B1 A1
:20	**Dance of the Geo Shapes:** Hexahedron	G6 G1
1:03	**Amazing Story of 9s–2**	
:20	**Dance of the Geo Shapes:** Pentagonal pyramid	G6 G1
1:42	**Amazing Story of 9s–3**	
3:26	**Change Your Point of View:** Problem-solving heuristic	D2
2:44	**Blackstone–1 to 8 Mind Reading:** Trick involving odd numbers	B3 D2
2:40	**The Fraction Rap:** Defining fractions	A3 B1
8:41	**Mathnet: Problem of the Dirty Money–5**	A3

WEEK SIX

SHOW NUMBER 126 Major emphasis: Data Organization

1:10	**Data Headache III:** Line graph	F6
4:36	**Dragon Maintenance:** Pie chart	F6 A5
2:58	**Graph of Love:** Broken line graph	F6 D1
3:45	**Blackstone–A Card Trick Without Cards:** Trick based on inverse operations	D2 B1
3:18	**Infinity:** Graphic suggestions of infinity	D1 B1
:41	**Infinity (Infinite Regress):** Dynamic suggestion of infinite regress	D1 G2
10:18	**Mathnet: Mystery of the Maltese Pigeon–1**	B1 D1 G4

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SHOW NUMBER 127 Major emphasis: Scale

2:24 **Eagle Express: Tulsa–1:** Using a map scale to find distance — C1 G4 B1
2:14 **Draw a Map:** Making a map with landmarks and scale — G4 C2
4:22 **Eagle Express: Tulsa–2:** Importance of knowing proper scale
2:32 **Appliance Pull–1:** Measuring perimeter — C2 B1 G6 G4
2:04 **Fortune Teller:** Trick based on inverse operations — D2 B1
1:35 **Appliance Pull–2:** Measuring inside and outside perimeter
10:59 **Mathnet: Mystery of the Maltese Pigeon–2** — F4

SHOW NUMBER 128 Major emphasis: Probability

2:37 **Suds: Raffle Ticket–1:** Probability of 1/1000 — F1 A3 A2
1:15 **Person on the Street:** Dodecahedron — G6
:20 **Dance of the Geo Shapes:** Dodecahedron — G6 G1
2:12 **Suds: Raffle Ticket–2:** Using percentage to divide winnings — A3 F4 B1
2:18 **Grempod and Blotmo–Sponge Candy:** Probability of 1/4 — F1 A3
1:10 **Suds: Raffle Ticket–3:** Changing probability — A3
6:25 **Tony and the Togas:** Roman numerals — A2
2:04 **Blackstone–Dime, Penny, Nickel:** Trick based on odd and even numbers — B3 B1
8:19 **Mathnet: Mystery of the Maltese Pigeon–3**

SHOW NUMBER 129 Minor emphasis: Percent

3:25 **Perfect Squares:** Graphic suggestions of square numbers — B2 B1
1:27 **Oops! Subtraction 300–163:** Borrowing mistake in subtraction — A2 B1
6:20 **Matinee Movie–Cartablanca:** Rounding up weights — B4 B1
2:25 **Percents:** Equivalent fractions/decimals/percents — A5 A3 A4
1:13 **Mathman:** Percentages less than 1/2 — A5 D1
3:51 **In Search of the Giant Squid:** Scale on a submarine map — C1 G4
7:05 **Mathnet: Mystery of the Maltese Pigeon–4**

SHOW NUMBER 130

5:18 **Phoneymooners–Juggling the Books:** Rearranging piles to find the average — F2 B1
:54 **Grocery Packing–1:** Noncomputational algorithm — D2
1:58 **You Can Count on It:** Mathematics in the world — C1
:55 **Grocery Packing–2**
:53 **Grocery Packing–3**
1:10 **Trout on Your Head:** Horizontal bar graph — F6 A5
1:05 **Grocery Packing–4**
4:11 **But Who's Adding?:** Select addends and give sums — B1 D1
9:27 **Mathnet: Mystery of the Maltese Pigeon–5**

WEEK SEVEN

SHOW NUMBER 131 Major emphasis: Place Value

2:25 **Mathematics R Us:** Place value holder — A2 D1
5:01 **Battle of the Bulge Caterers: Bonbons–1:** Place value to thousands place — A2
2:18 **Mistakes:** Learning from mistakes
5:23 **Battle of the Bulge Caterers: Bonbons–2**
:35 **Pos vs. Neg Jousts–The Wall:** Adding positive and negative numbers — A6 B1
1:34 **Dropped Coin:** Subtraction problem — B1
6:14 **Zero Pacs:** Multiplying by 10s — A2 B1
6:47 **Mathnet: Problem of the Trojan Hamburger–1** — F4

SHOW NUMBER 132 Major emphasis: Metric Measurement

2:56 **Eagle Express: Bemidji–1:** Using a map scale to find distance — C2 G4 B1
1:07 **Feet Into Meters:** Converting feet into meters — C1
3:43 **Eagle Express: Bemidji–2:** Triangular route between cities
3:20 **Metric Electric Lover:** Metric/standard system units — C1
4:33 **But Who's Adding?:** Select addends and give sums — B1 D1
10:55 **Mathnet: Problem of the Trojan Hamburger–2** — C2 B1 C3

SHOW NUMBER 133 Minor emphasis: Tessellations; Fibonacci Sequences

2:08 **Phoner:** Fibonacci sequence — B3 D2
2:33 **Blackstone–Lightning Calculator:** Number trick based on Fibonacci Sequence — B3 B1
1:17 **Mathman:** Percentages more than 1/2 — A5 D1
6:13 **King's Stooges:** Arranging tables of 4 for 20 people — C2 G6
1:04 **Person on the Street:** Tessellations — G3
3:15 **Tessellations:** Tessellations on the beach — G3 G6
1:33 **Tessellation:** Tessellation with sneakers/TVs — G3 D1

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9:01 **Mathnet: Problem of the Trojan Hamburger–3** B1 C1 C3

SHOW NUMBER 134 Major emphasis: Percent

3:22 **Stephan's Stereo:** Equivalent fractions/decimals/percents A5 A4 A3
5:47 **Welcome Back Blotter:** Illustrations of percent A5 A4 A3
2:47 **Eight Percent of My Love:** Percentages and a pie chart A5 F6
5:43 **But Who's Counting?:** Largest 5-digit number A2 D1 F4
:32 **Side By Side:** Using your head to estimate B4 B1
8:02 **Mathnet: Problem of the Trojan Hamburger–4**

SHOW NUMBER 135 Minor emphasis: Rates and Ratios

1:14 **Don't Ratio Without It:** Ratios B5
2:15 **Don't Be Nosey:** Ratios B5 A3
3:05 **Blackstone–1089:** Algorithm always giving the answer 1089 D2 G2 B1
2:27 **Problem Song:** Rate problem peeling apples B5 A3 B1
3:50 **Coatrack:** Logic problem pouring liquid C1 C2
:31 **Double Star Polygon:** 5-point star and pentagon G6
12:08 **Mathnet: Problem of the Trojan Hamburger–5**

WEEK EIGHT

SHOW NUMBER 136 Major emphasis: Fractions

2:27 **Harry's Hamburger Haven:** Equivalent fractions/decimals/percents A4 A5 A3
2:24 **Action on the Fraction Bar:** Fraction vocabulary A3 A4 A5
6:18 **But Who's Multiplying?:** Select factors and give products B1 B2 D1 F4
:17 **Mixed Numbers:** Graphic depiction of mixed numbers A3 D1
3:43 **Dinner by the Dozen:** Using fractions to divide popsicles A3 B5 B1
2:57 **Kubrick's Rube:** Computer program to suggest infinity D1 D2
:30 **Snowflake:** Suggestion of a fractal G2 G6
8:05 **Mathnet: Problem of the Missing Monkey–1** C3 D1

SHOW NUMBER 137

6:46 **HBC Programming:** Bar graph F6 F5 A3 F4
:58 **Man at Desk (Head Calculator):** Mental math B1 B2
3:33 **X...It's the Sign of the Times:** Multiplication symbol B1
4:16 **Blackstone–21 Card Trick:** Card manipulations and counting A1
1:15 **Mathman:** Factors of 60 B2

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:20 **Quadrilaterals:** Different quadrilaterals G6
9:40 **Mathnet: Problem of the Missing Monkey–2** G4 C3 B1 E1

SHOW NUMBER 138 Major emphasis: Parity

4:29 **Odd Numbers Strike:** Attributes of odd numbers B3 D1
:34 **Odd/Even Bricks:** Patterns based on odd and even numbers B3
2:36 **Math Rap:** Mathematics in the world
5:17 **But Who's Counting?:** Largest 5-digit number A2 D1 F4
:50 **Soda Shoppe:** Computing a tip and rounding up A5 A4 B4
4:55 **Phoneymooners–In the Doghouse:** Odd and even numbers B3 B1
8:18 **Mathnet: Problem of the Missing Monkey–3** G4 B5

SHOW NUMBER 139 Major emphasis: Working Backwards (Problem Solving)

2:42 **So-Fari, So-Goodi-1:** Working backwards to solve a problem D2 B1
:54 **Person on the Street:** Googol A1
:22 **Googol:** The number one googol A1 B1
1:43 **So-Fari, So-Goodi–2**
:53 **Googol:** Discussing the number one googol A1 B1
3:15 **So-Fari, So-Goodi–3**
3:05 **So-Fari, So-Goodi–4**
2:01 **Bureau of Missing Numbers:** Attributes of 10 B2 B1
3:16 **Burger Pattern:** Triangular number pattern D2 D1 B1
8:17 **Mathnet: Problem of the Missing Monkey–4**

SHOW NUMBER 140 Major emphasis: Probability

5:01 **Let's Do a Deal–1:** Probability F1 A3
4:20 **Ghost of a Chance:** Probabilities in several situations F1 F3
4:10 **Let's Do a Deal–2**
2:16 **Blackstone–Card and Number:** Algorithm always giving answer of 18 D2 B1 B3
10:01 **Mathnet: Problem of the Missing Monkey–5**

WEEK NINE

SHOW NUMBER 141 Major emphasis: Angles

4:10 **Moderately Frightening Stories:** Computer program that runs forever D1 B3
1:09 **Mathman:** Multiples of 5 B2
5:40 **Battle of the Bulge Caterers–Trays:** Arranging sandwiches on a tray C2 C4
2:47 **Forestry I:** Collecting data F5 B4

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2:23 **Angle Dance:** Body movements illustrate angles — G6
3:00 **Playing the Angle:** Angles and arcs in basketball — G6 F4 C2 A3
:19 **Pong Game:** Billiard geometry — G2 G6
6:27 **Mathnet: Case of the Missing Baseball–1** — G6 G4

SHOW NUMBER 142 Major emphasis: Data Processing

2:08 **Pollster–1:** Nonrepresentative samples — F4 A5 F5 F6
3:26 **Forestry II:** Statistical sampling — C3 C2 F5 C1
2:05 **Pollster–2**
3:17 **Blackstone–Coin Mindreading:** Coin trick based on 9s — B1
1:39 **Pollster–3:** Representative samples
:42 **Hundred Squares Table:** Number patterns of multiples — B2 D2
3:50 **Neighborhood Superspy:** Alphanumeric code — D2 D1
3:14 **Top Secret No Peeking:** Parentheses in arithmetic problem — B1
5:23 **Mathnet: Case of the Missing Baseball–2** — G4

SHOW NUMBER 143 Major emphasis: Geometric Objects

3:20 **How to Build a Bridge–1:** Unstable line segment struts — G6
:16 **Juxtaposing the Angles of a Triangle:** Angles and degrees in triangles — G6
:58 **How to Build a Bridge–2:** Unstable rectangle
2:02 **Triangle Song:** Triangle shapes in the world — G6
:52 **How to Build a Bridge–3:** Stable right triangle supports
3:09 **Forestry III:** Trigonometry — C3 C2 G6 F5
3:26 **Mathematics R Us:** The cube — G1 G6
1:43 **Baloney:** Making a list of possible combinations — E1 F6
:31 **Bridge Montage:** Triangles in bridges — G6
5:48 **But Who's Counting?:** Smallest 5-digit number — A2 D1 F4
6:17 **Mathnet: Case of the Missing Baseball–3** — F4 A9

SHOW NUMBER 144 Major emphasis: Spatial Measurement

2:20 **Cabot & Marshmallow–Wooden Candy Bars:** Different dimensions –same volume — C2 C1
3:47 **Forestry IV:** Approximating volume — C2 C1 C3
1:51 **Oops! Decimals/Multiplication 4.3 x 2.6:** Wrong decimal point placement — A4 B1
3:48 **Queen's Bed:** Nonstandard units — C1 C2 D1
:57 **Mathman:** Multiples of 6 — B2

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2:58 **Countin' Out the Rhythm:** Counting beats in a musical measure — D2 B1
3:21 **But Who's Adding?:** Select addends and give sums — B1 D1
7:42 **Mathnet: Case of the Missing Baseball–4** — B4 G4 C3 B5

SHOW NUMBER 145 Major emphasis: Additivity

5:19 **Phoneymooners–At the Lodge:** Venn diagrams and additivity — F6 C4
3:06 **Forestry V:** Linear programming — C3 C2 G6 C4
1:11 **Oops! Ruler:** Mistake in lining up a ruler — C2
3:31 **Cosmic Carpets:** Measuring the same area twice — C4 C2 G4 G6
2:32 **Square Song:** Geometric properties of squares — G6
2:58 **Blackstone–Faceup, Facedown:** Logical card trick — B3
:24 **Pos vs. Neg Jousts–Taking a Break:** Adding positive and negative numbers — A6 B1
6:41 **Mathnet: Case of the Missing Baseball–5** — G4 G6

WEEK TEN

SHOW NUMBER 146 Major emphasis: Square Numbers

3:01 **Phoner:** Squaring 2-digit number ending in 5 — D2 B1
6:05 **Broadway:** Square number patterns — B2 D2 G6 B1
2:05 **Bureau of Missing Numbers:** Attributes of 36 — B2 B1 A4
:55 **Square Dance:** Square number arrays — D2 B2 G6 G2
3:25 **Perfect Squares:** Graphic suggestions of square numbers — B2 B1
1:27 **The Map:** Estimating time/distance using map/scale — G4 C3 B1
9:51 **Mathnet: Problem of the Passing Parade–1** — B4 B1 B5 G4

SHOW NUMBER 147 Major emphasis: Rounding

2:28 **Mathematics R Us:** Rounding — B4 D1 A4
:25 **Stick Squares I:** Dividing a square into square units — G6
3:02 **Round It Off:** Rounding numbers — B4
2:40 **Artist's License:** Doubling dimensions quadruples area — C2 D2
1:10 **Area (6 x 8):** Area of a rectangle — C2
1:20 **Five-Nineteen Blues:** When to round numbers — B4
6:26 **But Who's Counting?:** Largest sum of 2- and 3-digit numbers — A2 D1 F4
9:07 **Mathnet: Problem of the Passing Parade–2** — C3 G6 G4

SHOW NUMBER 148 Minor emphasis: Multiplication

1:27 **Mathman:** Factors of 24 — B2
5:37 **But Who's Multiplying?:** Select factors and give products — B1 B2 D1 F4

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1:13 **Oops! Multiplication 603 x 7:** Mistake multiplying with zero — B1
2:07 **Birthday Party:** 56 people at 7 tables — B1
2:30 **Jenny Didn't Call:** Mathematical pattern of behavior — D2
2:39 **Blackstone–Magic Social Security Number:** Cyclic permutations — D2 B1
:32 **Number Pattern:** Cyclic number — D2
10:06 **Mathnet: Problem of the Passing Parade–3** — C2

SHOW NUMBER 149 **Major emphasis: Functions**

3:48 **Mathematics R Us:** Function machine — D2
1:21 **Mathman:** Multiples of 3 — B2
1:00 **Doin' Nothin I:** Multiplying/dividing by 1 — D2 B1
6:41 **Celebrity Kitchen:** Function machine — D2 B1 A4 A3
1:06 **Doin' Nothin II:** Adding/subtracting zero — D2 B1
1:56 **Cabot & Marshmallow–Sq. Pegs in Rd. Holes:** Rotational symmetry — G2
2:34 **Nines:** Song/digits of multiples of 9 add up to 9 — B2 D2 B1
:23 **Rotational Symmetry:** Rotational symmetry of a star — G2
7:21 **Mathnet: Problem of the Passing Parade–4**

SHOW NUMBER 150

4:21 **I Love Lupy: Packing Licorice–1:** One-dimensional packing — C2 B1 B2
:31 **Pos vs. Neg Jousts–Straight Ahead:** Adding positive and negative numbers — A6 B1
4:39 **I Love Lupy: Packing Licorice–2**
4:32 **Sugar Ray Sketch:** Weighing a dog — C2 B1
2:56 **Think About the Problem:** Problem-solving heuristics — D1
9:01 **Mathnet: Problem of the Passing Parade–5** — D2 F4

WEEK ELEVEN

SHOW NUMBER 151 **Minor emphasis: Pentominoes**

7:16 **But Who's Counting?:** Largest difference 2- and 3-digit numbers — A2 D1 F4
:57 **Person on the Street:** Pentomino — G6
2:27 **Joke in the Box:** Open-top boxes from pentominoes — G6 G1
1:33 **Pentominoes:** 12 possible arrangements of a pentomino — G2 G6
3:46 **Really Gross Profit:** Pay bills before calculating profit — B1

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2:05 **Perpendicular Lines:** Examples in the world — G6
8:35 **Mathnet: Trial of George Frankly–1**

SHOW NUMBER 152

4:29 **Mike Merv Show:** Angles and parabola of football flight — G6 F6
2:16 **Average American:** Statistical averages — F2
2:55 **Blackstone–The Elimination Game:** Card game involving logic — B3
:58 **Mathman:** Even numbers — B3
3:30 **Life Raft:** Zero divided by non-zero number is zero — B1
:40 **Multiply by Zero:** Multiplying by zero — B1 A1
2:40 **Rappin' Judge:** Round-trip rate problem — B5 C2 B1
8:52 **Mathnet: Trial of George Frankly–2** — B4 B5 C2

SHOW NUMBER 153 **Major emphasis: Place Value**

7:56 **Willy Glutton Bank Robber:** Dividing by regrouping numbers — A2 B1 A1
1:58 **You Can Count on It:** Mathematics in the world — C1
4:35 **But Who's Mutliplying?:** Select factors and give products — B1 B2 D1 F4
:25 **Tetrahedron:** Tetrahedron shape — G1 G6
2:14 **Zero Pacs:** Multiplying by 10s — A2 B1
9:24 **Mathnet: Trial of George Frankly–3** — F4 A2

SHOW NUMBER 154 **Minor emphasis: Palindromes**

3:56 **Bobo's Dilemma:** Logic problem using geometry — G6 C2
1:22 **Person on the Street:** Palindrome — A2
2:53 **It's a Palindrome:** Attributes of a palindrome — A2
:35 **Palindrome:** Generating palindromes — A2 D2 B1
:47 **Groaning Wall:** Mathematical riddles
3:08 **Blackstone–The Magic Spells:** Trick based on logic and counting — D2 B2
:30 **Pos vs. Neg Jousts–The Abyss:** Adding positive and negative numbers — A6 B1
13:26 **Mathnet: Trial of George Frankly–4** — B1

SHOW NUMBER 155 **Major emphasis: Quadrilaterals**

5:49 **King for a Day:** Dividing a trapezoid — G6
1:15 **Mathman:** Multiples of 4 — B2
1:09 **Person on the Street:** Quadrilaterals — G6
2:55 **An Interesting Game of Football:** Irregularly shaped quadrilaterals — C2 C3 G6 G4
:20 **Quadrilaterals:** Quadrilateral shapes — G6
2:40 **The Fraction Rap:** Defining fractions — A3 B1

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9:30 **Mathnet: Trial of George Frankly–5** B5

WEEK TWELVE

SHOW NUMBER 156

4:55 **Spade Parade: Fishy Anchovy–1:** Chart used to solve logic problem F6
2:39 **More Than One Way:** Ways to solve problems
2:42 **Spade Parade: Fishy Anchovy–2**
1:12 **Mathman:** Factors of 8 B2
4:12 **Gypsy Rose Amicable:** Amicable numbers B2 B1
:41 **Stick SquaresIII:** Dividing a square into square units G6
3:05 **Blackstone–Cups:** Logic problem of parity and observation B3
6:35 **Mathnet: Problem of the Dirty Money–1**

SHOW NUMBER 157 Major emphasis: Scale

3:23 **Scales on the Brain–1:** Change in scale G4 B5 A3
2:14 **Draw a Map:** Making a map with landmarks and scale G4 C2
1:22 **Scales on the Brain–2:** Handshake ratio of 1 to 500
5:33 **But Who's Multiplying?:** Select factors and give products B1 B2 D1 F4
4:03 **Gingerman Sketch:** Dividing a bill B1 F2
:50 **Soda Shoppe:** Computing a tip and rounding up A5 A4 B4
9:24 **Mathnet: Problem of the Dirty Money–2** A9 A3 G4 B5

SHOW NUMBER 158 Major emphasis: Data Processing

2:06 **Callous: The Survey–1:** Collecting and organizing data F5 F6 A5 F4
1:10 **Data Headache I:** Bar graph F6
3:57 **Callous: The Survey–2**
1:32 **Data Headache II:** Pie chart F6
2:57 **Callous: The Survey–3**
1:13 **Mathman:** Percentages less than ½ A5 D1
1:50 **Smokestacks Go Boom:** Thirds A3
1:09 **Counting the Elephants:** Broken line graph F5 F6
2:58 **Graph of Love:** Broken line graph F6 D1
1:10 **Data Headache III:** Line graph F6
6:02 **Mathnet: Problem of the Dirty Money–3**

SHOW NUMBER 159

5:54 **The Duelists:** Taxi geometry G4 C1 G6
2:04 **Phoner–Consecutive Odd Numbers:** Add to get square number B3 B2 B1
2:08 **Shape Up:** Geometric shapes and vocabulary G6

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6:52 **But Who's Counting?:** Largest sum of 2 3-digit numbers A2 D1 F4
1:35 **Pop Up Book:** Dimensionality G1
7:56 **Mathnet: Problem of the Dirty Money–4**

SHOW NUMBER 160 Minor emphasis: Large Numbers

:24 **Pos vs. Neg Jousts–Taking a Break:** Adding positive and negative numbers A6 B1
2:05 **Less Than Zero:** Negative numbers A6 D1
5:04 **Million Dollar Giveaway:** $1,000,000 for 20,000 people A1 C3 B1 C1
:54 **Person on the Street:** Googol A1
:53 **Googol:** Discussing the number googol A1 B1
2:48 **Blackstone–Move the Clip:** Trick using symmetry G2
:39 **Groaning Wall:** Mathematical riddles
4:23 **Set Up (Mandrell Concert):** Mathematics in setting up a concert D1
8:41 **Mathnet: Problem of the Dirty Money–5** A3

WEEK THIRTEEN

SHOW NUMBER 161 Minor emphasis: Permutations

4:20 **Photograph All About It:** Possible orders of 2, 3 4, and 5 things E1 B1
3:26 **Change Your Point of View:** Problem-solving heuristic D2
1:49 **Multi-Gloves:** Different combinations of 5 colors E1
:16 **Concentric Circles** G6
4:39 **But Who's Adding?:** Select addends and give sums B1 D1
:27 **Number Pattern:** 9 x 1 + 2 = 11, and so on D2 B1
1:19 **Mathman:** Decimals less than .5 A4 D1
10:18 **Mathnet: Mystery of the Maltese Pigeon–1** B1 D1 G4

SHOW NUMBER 162 Minor emphasis: Rates

5:57 **Superguy–Flying Down to Freezo:** Functions; converting money units B5 D2 B1
:60 **John Moschita–Robin Hood:** Living graph F5 F6 B5 D2
2:27 **Problem Song:** Rate problem peeling apples B5 A3 B1
5:32 **But Who's Counting?:** Largest sum of 2- and 3-digit numbers A2 D1 F4
10:59 **Mathnet: Mystery of the Maltese Pigeon–2** F4

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SHOW NUMBER 163 Major emphasis: Probability

1:41 **Cabot & Marshmallow: Probability–1:** Probability of 1 — F1 D1
2:50 **Grempod and Blotmo–Alien Visit:** Changing probabilities — F1 A3 D1
1:12 **Mathman:** Odd numbers — B3
2:19 **Cabot & Marshmallow: Probability–2:** Probability of zero — F1
4:20 **Ghost of a Chance:** Probabilities in several situations — F1 F3
4:50 **Tuesday Noon Football:** Probabilities of ½ — F1 A3
1:11 **Tessellation Animation–Quilt:** Tessellations on a quilt — G3 G6
8:19 **Mathnet: Mystery of the Maltese Pigeon–3**

SHOW NUMBER 164 Major emphasis: Functions Coding

4:35 **Spade Parade: Missing Michael Angelo–1:** Logic problem involving code — F4 F5 F6
3:25 **Mathematics R Us–1:** Wordsworth table — D2 B1
6:35 **Spade Parade: Missing Michael Angelo–2**
:13 **Mathematics R Us–2**
:20 **Dance of the Geo Shapes:** Triangular prism — G6 G1
3:50 **Neighborhood Superspy:** Alpha-numeric code — D2 D1
:20 **Dance of the Geo Shapes:** Hexahedron — G6 G1
7:05 **Mathnet: Mystery of the Maltese Pigeon–4**

SHOW NUMBER 165 Major emphasis: Infinity, Parity

2:57 **Kubrick's Rube:** Computer program to suggest infinity — D1 D2
3:18 **Infinity (Song):** Graphic suggestions of infinity — D1 B1
:41 **Infinity (Infinite Regress):** Dynamic suggestion of infinite regress — D1 G2
:35 **Odd and Even Hands:** Odd and even numbers — B3
4:14 **Odd Pair:** Adding odd and even numbers — B3 B1
1:11 **Moebius Trip:** Demonstrating one-sided Moebius strip — G6 G7
:49 **Moebius Trip:** One-sided car trip — G6 G7
2:54 **Blackstone–Heads or Tails:** Coin trick involving parity — B3
9:27 **Mathnet: Mystery of the Maltese Pigeon–5**

WEEK FOURTEEN

SHOW NUMBER 166 Major emphasis: Multiples and Factors

:12 **Hundred Square:** Common multiples of 8 and 12 — B2 D2
5:08 **Multiple Pizzas:** Lowest common multiple 8 and 12 — B2 A3
:12 **Multiples of 8 and 12:** Multiples of 8 and 12 on a 100 grid — B2 D2
3:33 **X...It's the Sign of the Times:** Multiplication symbol — B1
:30 **Factor Tree:** Prime factors of 300 — B2 B1
5:33 **Factor Tree:** Prime factors of different numbers — B2 B1
3:46 **But Who's Multiplying?:** Select factors and give products — B1 B2 D1 F4
:57 **Mathman:** Multiples of 6 — B2
6:47 **Mathnet: Problem of the Trojan Hamburger–1** — F4

SHOW NUMBER 167 Minor emphasis: Tessellations

5:14 **Mathwoman and the Boy Number–1:** One-dimensional packing with boards — C2 B1 B2
:21 **Number Pattern–1:** Multiples of 3 and 37 — B2 D2
1:04 **Person on the Street:** Tessellations — G3
3:15 **Tessellations:** Tessellations on the beach — G3 G6
3:19 **Mathwoman and the Boy Number–2**
:21 **Number Pattern–2** — D2
2:02 **Blackstone–Mental Speller:** Trick based on counting letters — D2
10:55 **Mathnet: Problem of the Trojan Hamburger–2** — C2 B1 C3

SHOW NUMBER 168 Major emphasis: Fractions

3:54 **Mathematics R Us:** Fraction reducing machine — A3 D1
1:24 **Mathman:** Fractions equivalent to ⅓ — A3
2:45 **Sloppy Kitchen Commercial:** Fractions equivalent to ⅕ — A3
:42 **Stick Squares II:** Dividing a square into square units — G6
2:24 **Action at the Fraction Bar:** Fraction vocabulary — A3 A4 A5
4:11 **But Who's Adding?:** Select addends and give sums — B1 D1
:32 **Overlapping Squares:** Squares in a 4 x 4 array — C4 G6
1:35 **Cabot & Marshmallow–What Day Is It?:** Fractional parts of a week — A3 B1
9:01 **Mathnet: Problem of the Trojan Hamburger–3** — B1 C1 C3

SHOW NUMBER 169 Major emphasis: Area and Perimeter

2:23 **Angle Dance:** Body movements illustrate angles — G6
4:40 **How Does Your Garden Grow?:** Area, perimeter, and scale — C2 G4
3:16 **Burger Pattern:** Triangular number pattern — D2 D1 B1
7:06 **McMath:** Finding largest area of a rectangle — C2 G6 B1
:58 **Mathman:** Even numbers — B3
8:02 **Mathnet: Problem of the Trojan Hamburger–4**

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SHOW NUMBER 170 Minor emphasis: Percents

3:56 **Spade Parade: Foul Ball–1:** Logic problem — B3 B2

2:25 **Percents:** Equivalent fractions/decimals/percents — A5 A3 A4

4:40 **Spade Parade: Foul Ball–2**

2:27 **Harry's Hamburger Haven:** Equivalent fractions/decimals/percents — A4 A5 A3

12:08 **Mathnet: Problem of the Trojan Hamburger–5**

WEEK FIFTEEN

SHOW NUMBER 171 Minor emphasis: Metric Measurement

1:11 **Oops! Ruler:** Mistake in lining up a ruler — C2

3:17 **Mathematics R Us:** Tape measure for perimeter — C2 C1 G6

3:20 **Metric Electric Lover:** Metric/standard system vocabulary — C1

1:03 **Symmetry Patterns:** Repeating symmetrical pattern — G2 G6

4:27 **Counting the House:** Counting the same section twice — C4 B1

4:33 **But Who's Adding?:** Select addends and give sums — B1 D1

8:35 **Mathnet: Trial of George Frankly–1**

SHOW NUMBER 172

1:12 **Mathman:** Factors of 18 — B2

5:37 **Harry & Elmo:** Efficient counting by grouping — C2 B1

2:56 **Think About the Problem:** Problem-solving heuristics — D1

2:34 **Bert and Ernie–Dog:** Cost of raising a dog — B4 B2

:33 **Pos vs. Neg Jousts–2 on 1:** Adding positive and negative numbers — A6 B1

3:03 **Blackstone–Miraskill-Candies:** Trick based on even numbers — B3 A2

1:42 **Plant a Spoon–1:** 3 seeds give 2 spoons the same color — D2

8:52 **Mathnet: Trial of George Frankly–2** — B4 B5 C2

SHOW NUMBER 173 Major emphasis: Logical Thinking

5:20 **Spade Parade: Des Moines Duck –1:** Chart used to solve logic problem — F6

3:49 **Spade Parade: Des Moines Duck–2**

1:09 **The Sale:** Finding percent from a discount — A5 B1 A3

2:47 **Eight Percent of My Love:** Percentages and a pie chart — A5 F6

3:10 **Sinbad and the 20 Coins:** Logic problem with different solutions — B3

9:24 **Mathnet: Trial of George Frankly–3** — F4 A2

SHOW NUMBER 174

3:57 **Very Nice:** Logic problem dividing up pails of milk — A3 B1

:24 **Groaning Wall:** Mathematical riddles

:23 **Perpendicular Lines** — G6

2:05 **Perpendicular Lines:** Examples in the world — G6

:47 **Groaning Wall**

2:25 **Cat, Bird, Kibble–1:** Classical logic problem — E3

:10 **John Moschita–Peter Piper:** Living graph of rate of speed — F5 F6 B5 D2

1:42 **Cat, Bird, Kibble–2**

13:26 **Mathnet: Trial of George Frankly–4** — B1

SHOW NUMBER 175

2:30 **Hold It Nobody Eat–1:** Fractions of a pie — A3

1:20 **Five-Nineteen Blues:** When to round numbers — B4

1:05 **Hold It Nobody Eat–2**

1:34 **Dropped Coin:** Subtraction problem — B1

:40 **Hold It Nobody Eat–3**

:20 **Number Pattern:** Sum of consecutive odd numbers — D2 B2

4:05 **Arthur Benjamin–Squaring II:** Shortcuts for squaring numbers — B1 A1

2:58 **Countin' Out the Rhythm:** Counting beats in a musical measure — D2 B1

2:13 **Sale!:** Rearranging digits to get lowest sum — A2 B1

9:30 **Mathnet: Trial of George Frankly–5** — B5

SEASON II

WEEK ONE

SHOW NUMBER 201

6:43 **Square One Squares:** Game of mathematical misconceptions — B5 C2 F6 G2 G4

5:39 **Dirk Niblick: Fool Most of the People–1:** Discount isn't as advertised — A5

3:14 **One Billion Is Big:** Relative sizes of million and billion — A1 A2

2:35 **Dirk Niblick: Fool Most of the People–2**

:21 **Number Pattern 37:** A simple number pattern — D2

8:44 **Mathnet: Case of the Willing Parrot–1** — C2 D2 G4

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SHOW NUMBER 202 Minor emphasis: Estimation

1:01 **Dirklet:** Estimation — B4
3:51 **Estimation:** Song about the usefulness of estimation — C3
7:43 **Close Call:** Estimation game — C1 C3
:35 **Multiply by Zero:** Product of any number and zero is zero — B1 A1
:26 **Spot the Quadrilaterals:** Identifying quadrilaterals among polygons — G6
1:39 **Mathman:** Polygons that are rectangles — G6
12:06 **Mathnet: Case of the Willing Parrot–2** — A5 D2 F1 F4 G6

SHOW NUMBER 203

3:18 **Blackstone–Crossed Out Numbers:** Trick based on numbers in a 4 x 4 array — D2
6:02 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
3:41 **Combo Jombo:** Combinatorics — B1 E1
1:18 **Mathman:** Square numbers — B2
12:13 **Mathnet: Case of the Willing Parrot–3** — B3 G6

SHOW NUMBER 204

5:39 **Triple Play:** Geometric strategy game — B1 G6
4:34 **Dirk Niblick–Illegal Lawyer–1:** Error in adding fractions — A3
2:23 **Phoner–The Answer Is 1:** Algorithm that always gives the result 1 — B1 D2
2:20 **Dirk Niblick: Illegal Lawyer–2**
1:15 **Groaning Wall:** Mathematical riddles
11:03 **Mathnet: Case of the Willing Parrot–4** — B3

SHOW NUMBER 205 Major emphasis: Modular Arithmetic

1:45 **Mathman:** Multiplying by 5 and adding 2 — B2 B3
4:40 **Blackstone–5-Envelope Spelling:** Trick based on remainders — D2
1:22 **Calvin Klein Boy:** Defining combinatorics — E1
3:31 **Time Keeper:** Song about clock arithmetic — B3
1:32 **Data Headache II:** Using a pie chart — F6
11:58 **Mathnet: Case of the Willing Parrot–5** — B1 B3 D2

WEEK TWO

SHOW NUMBER 206

5:31 **Dirk Niblick: To Heck and Back–1:** Distance, rate, and time — C2 C3
1:37 **Mathman:** Fractions greater than 1 — A3
2:20 **Dirk Niblick: To Heck and Back–2**
6:54 **Close Call:** Estimation game — A5 C1 C2
:15 **Mixed Numbers 4/3:** Graphic depiction of mixed numbers — A3 D1
3:42 **Prime Numbers:** Song about prime numbers — B2 B3
:23 **Prime Numbers:** Prime numbers on a 100 grid — B2
:41 **Square One Puzzler:** How many rectangles are in the diagram? — G6
5:43 **Mathnet: Case of the Great Car Robbery–1** — A5 B4 F5 F6

SHOW NUMBER 207

3:45 **Blackstone–Magic Safari:** Trick based upon counting — D2
8:07 **Square One Squares:** Game of mathematical misconceptions — A2 C4 D1 G2 G6
:41 **Stick Squares III:** Dividing a square into square units — G6
1:09 **Mathman:** Multiples of 5 — B2
2:36 **Me and My Shadow:** Comparing 2 and 3 dimensions — G1 C2
10:39 **Mathnet: Case of the Great Car Robbery–2** — A5 B4 F2 F5 F6

SHOW NUMBER 208

5:48 **Triple Play:** Geometric strategy game — B1 G6
1:17 **Dirklet–Use Graphs:** Problem-solving heuristic
1:37 **OOPS! 1/2 + 1/3 = 2/5:** Common mistake in adding fractions — B1 A3
4:21 **Common-Multiple Man:** Common multiples of 12, 16, and 24 — B2
1:33 **Mathman:** Polygons that are pentagons — G6
2:56 **Archimedes:** Inventions and discoveries of Archimedes
9:39 **Mathnet: Case of the Great Car Robbery–3** — B5 F5 F6

SHOW NUMBER 209

4:58 **Dirk Niblick: The Lint Trap–1:** Miscalculation of proper wages — B3
1:58 **You Can Count on It:** Mathematics in the world — C1
2:48 **Dirk Niblick: The Lint Trap–2**
:26 **Spot the Hexagons:** Identifying hexagons among polygons — G6
5:27 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
1:21 **Cabot & Marshmallow–Round to Confound:** Inappropriate rounding — B4 B1
10:31 **Mathnet: Case of the Great Car Robbery–4** — B1 B4 B5 F6

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SHOW NUMBER 210 Minor emphasis: Numerical Patterns

2:12 **Phoner—The Answer Is 6:** Algorithm that always gives the result 6 — **B1 D2**

1:46 **Dirklet—Look for a Pattern:** Problem-solving heuristic — **D2**

3:10 **Blackstone—Liar and Truthteller:** Logic is used to determine who has coin

1:43 **Baloney:** Making a list of possible combinations — **E1 F6**

1:29 **Mathman:** Solutions to $19-C<5$ — **B1 D1 D4**

15:24 **Mathnet: Case of the Great Car Robbery—5** — **B4 B5 F2 F5 F6**

WEEK THREE

SHOW NUMBER 211

7:02 **Square One Squares:** Game of mathematical misconceptions

6:07 **Dirk Niblick: Do Not Fold, Spindle—1:** 3 60-minute tapes vs. 2 90-minute tapes — **B5**

2:04 **LessThan Zero:** Negative integers — **A6 D1**

2:45 **Dirk Niblick: Do Not Fold, Spindle—2**

9:33 **Mathnet—Case of the Deceptive Data—1** — **A3 B4 F1**

SHOW NUMBER 212

:53 **Dirk Niblick: Go West Young Math—1:** Redistribution of land is necessary — **C2 D2**

1:59 **Bureau of Missing Numbers:** Attributes of 14 — **B2 B1**

:10 **Dirk Niblick: Go West Young Math—2**

:26 **Mathman:** $\frac{3}{8} + \frac{5}{8} = 1$ — **A3**

15:33 **Mathnet: Case of the Deceptive Data—2** — **A5 B4 F1 F5 F6**

SHOW NUMBER 213

:47 **Dirklet:** Equilateral Triangles — **G6**

2:23 **Angle Dance:** Body movements illustrate angles — **G6**

4:20 **Triple Play:** Geometric strategy game — **B1 G6**

1:25 **Mathman:** Polygons that are parallelograms — **G6**

:58 **Man at Desk (Head Calculator):** Mental arithmetic — **B1 B2**

17:20 **Mathnet: Case of the Deceptive Data—3** — **F1 F2 F5 F6**

SHOW NUMBER 214

7:00 **Close Call:** Estimation game — **A5 C1 C3**

2:20 **Blackstone—Number Affinity:** Blackstone demonstrates a number trick — **B1 D2**

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2:23 **Phoner—The Answer Is 3:** Algorithm that always gives the answer 3 — **D2 B1**

14:10 **Mathnet—Case of the Deceptive Data—4** — **C3 F5 F6**

SHOW NUMBER 215

1:25 **Mathman:** Polygons that are quadrilaterals — **G6**

2:55 **Think About the Problem:** Problem-solving heuristics — **D1**

5:19 **Piece of the Pie:** Game of data representation — **A5 B1 D1 F6**

14:48 **Mathnet—Case of the Deceptive Data—5** — **A5 B4**

WEEK FOUR

SHOW NUMBER 216 Minor emphasis: Numerical Patterns

2:51 **Blackstone—Magic Dice:** Sum of opposite faces of a die is 7 — **D2**

1:19 **Dirklet—Order of Multiplication:** Multiplying whole numbers in any order — **B1**

:52 **Square One Squares:** Game of mathematical misconceptions — **A3 D1 F1 F3 G6**

:19 **Number Pattern:** Square numbers — **D2 B2**

3:25 **Perfect Squares:** Graphic suggestions of square numbers — **B2 B1**

12:30 **Mathnet—View from the Rear Terrace—1** — **B4 B5 F5 F6**

SHOW NUMBER 217

6:06 **Dirk Niblick: Mall or Nothing at Mall—1:** Biased survey leads to problems — **A5 F5**

6:42 **Close Call:** Estimation game — **C1 C3**

:21 **Number Pattern 37:** A simple number pattern — **D2**

2:38 **Dirk Niblick: Mall or Nothing at Mall—2**

:41 **Palindrome:** Create palindromes — **A2 B1 D2**

11:09 **Mathnet—View from the Rear Terrace—2** — **A5 B4 F2 F5 F6**

SHOW NUMBER 218 Minor emphasis: Numerical Functions

5:36 **Dirk Niblick—Itty Bitty Business—1:** Misplaced decimal points cause problems — **A4 A5**

2:57 **Kubrick's Rube:** Computer program to suggest infinity — **D1 D2**

:35 **Mathman:** $\frac{1}{3} + \frac{2}{3} = 1$ — **A3**

2:59 **Dirk Niblick: Itty Bitty Business—2**

2:01 **Perpendicular Lines:** Examples of perpendicular lines — **G6**

2:03 **Phoner—The Answer Is 5:** Algorithm that always gives the result 5 — **B1 D2**

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1:42 **OOPS! 34 x 12:** Multiplication algorithm mistake — B1

9:32 **Mathnet: View from the Rear Terrace–3** — A5 B4 F5 F6

SHOW NUMBER 219

6:09 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6

2:46 **Blackstone–13 Turns:** Trick based upon parity of turned die — B3

:34 **Pos vs. Neg Jousts–The Wall:** Adding positive and negative numbers — A6 B1

16:58 **Mathnet: View from the Rear Terrace–4** — A5 B1 F2

SHOW NUMBER 220

2:40 **Rappin' Judge:** Round-trip rate problem — B5 C2 B1

4:41 **Triple Play:** Geometric strategy game — B1 G6

18:17 **Mathnet: View from the Rear Terrace–5**

WEEK FIVE

SHOW NUMBER 221

6:25 **Tony and the Togas:** Roman numerals — A2

4:34 **Dirk Niblick: Illegal Lawyer–1:** Error in adding fractions — A3

1:23 **The Map:** Estimating time/distance using map/scale — G4 C3 B1

2:20 **Dirk Niblick: Illegal Lawyer–2**

2:45 **Spade Parade: In Search of Yucca Puck–1:** Logic problem sorting truth from lies — E3

:14 **Sum of the Angles of a Triangle:** Juxtaposing the angles of a triangle — G6

2:32 **Spade Parade: In Search of Yucca Puck–2**

1:13 **Mathman:** Decimals greater than ½ — A4 D1

5:46 **Mathnet: Case of the Missing Air–1** — C3

SHOW NUMBER 222 Major emphasis: Arithmetic of 9s

8:31 **Close Call:** Estimation game — C1 C2 C3

4:31 **Amazing Story of 9s–1:** Digits of multiples of 9 add up to 9 — B2 D2 B1 A1

:18 **Multiples of 9:** Multiples of 9 on a 100 grid — B2

1:03 **Amazing Story of 9s–2:** Digits of multiples of 9 add to 9

1:37 **Dirklet–Divisible by 9:** Divisibility test for nine — B1

1:42 **Amazing Story of 9s–3**

:28 **Double Star Polygon:** Symmetry — G6

Length ▸ Title and Description ▸ Content Areas

2:34 **Nines:** Song/digits of multiples of 9 add up to 9 — B2 D2 B1

6:35 **Mathnet: Case of the Missing Air–2** — C3 F5

SHOW NUMBER 223

3:22 **Blackstone–Dice and Cards:** Trick based on the roll of the dice — D2

:21 **Pos vs. Neg Jousts–Paratroopers:** Adding positive and negative numbers — A6 B1

2:00 **Triangle Song:** Triangle shapes in the world — G6

6:33 **Triple Play:** Geometric strategy game — B1 G6

:52 **Person on the Street–Hypotenuse:** Define "hypotenuse" — G6

13:46 **Mathnet: Case of the Missing Air–3** — D1 F1 F4 F5 F6

SHOW NUMBER 224 Minor emphasis: Percents

7:00 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6

5:39 **Dirk Niblick: Fool Most of the People–1:** Discount isn't as advertised — A5

:28 **Mathman:** 45% + 55% = 100% — A5

2:35 **Dirk Niblick: Fool Most of the People–2**

2:47 **Eight Percent of My Love:** Percentages and a pie chart — A5 F6

:18 **Parallel/Not Parallel:** Parallel vs. nonparallel — G6

8:30 **Mathnet: Case of the Missing Air–4** — G4

SHOW NUMBER 225

9:29 **Square One Squares:** Game of mathematical misconceptions — B5 F4 F6 G2 G6

3:15 **Blackstone–Quarter Parity:** Coin trick based on parity — B3

1:45 **Mathman:** Solutions to $3 + X > 10$ — A4 B1 D1 D4

:46 **Multiples of 8 and 12:** Multiples of 8 and 12 on a 100 grid — B2

:49 **Soda Shoppe:** Computing a tip and rounding off — A5 A4 B4

8:40 **Mathnet: Case of the Missing Air–5** — F6

WEEK SIX

SHOW NUMBER 226

1:18 **Dirklet–Divisible by 5:** Divisibility test for 5 — B1

3:13 **Blackstone–Turning the Die:** Trick based on pattern of turned die — B3 D2

PROGRAM GUIDE

Length ▸ Title and Description ▸ Content Areas

2:25 **Ratings War:** Double bar graph — F6 F5
6:10 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
2:11 **Draw a Map:** Making a map with landmarks and scale — G4 G4 C2
11:47 **Mathnet: Case of the Map with a Gap–1** — A4 B4 E3 G2 G5

SHOW NUMBER 227

3:51 **Estimation:** Song about the usefulness of estimation — C3
6:24 **Square One Squares:** Game of mathematical misconceptions
2:18 **Grempod and Blotmo–Sponge Candy:** Probability of ¼ — F1 A3
2:27 **Harry's Hamburger Haven:** Equivalent fractions/decimals/percents — A4 A5 A3
1:45 **Dirklet–Number Trick:** Simple trick with whole numbers — A2
:25 **Spot the Pentagons:** Identify pentagons among polygons — G6
10:04 **Mathnet: Case of the Map with a Gap–2**

SHOW NUMBER 228 Minor emphasis: Triangles

1:09 **Dirklet: Paper and Pencil–1**
2:50 **Phoner–The Answer Is 2:** Algorithm that always gives the result 2 — B1 D2
3:05 **Blackstone:** Algorithm always giving the answer 1089 — D2 G2 B1
5:24 **Triple Play:** Geometric strategy game — B1 G6
3:02 **Average American:** Statistical averages — F2
12:17 **Mathnet: Case of the Map with a Gap–3** — B5 C1 C2 G4 G6

SHOW NUMBER 229

8:14 **Close Call:** Estimation game — A5 C1 C2
1:25 **Mathman:** Polygons that are hexagons — G6
5:31 **Dirk Niblick: To Heck and Back–1:** Distance, rate, and time — C2 C3
1:18 **Five-Nineteen Blues:** When to round numbers — B4
2:20 **Dirk Niblick: To Heck and Back–2** — G2
8:08 **Mathnet: Case of the Map with a Gap–4**

SHOW NUMBER 230 Minor emphasis: Numeration

3:31 **Time Keeper:** Song about clock arithmetic — B3
4:58 **Dirk Niblick: The Lint Trap–1:** Miscalculation of proper wages — B3
:31 **Rotational Symmetry** — G2
1:36 **Mathman:** Polygons with a line of symmetry — G2

Length ▸ Title and Description ▸ Content Areas

2:48 **Dirk Niblick: The Lint Trap–2**
:25 **Decimals/Percents/Fractions–25%:** Equivalence: decimal, fraction, percent — A5 A3 A4
3:22 **Diet Lite Wet:** Equivalent fractions/decimals/percents — A3 A5 A4
:58 **Square One Puzzler–Calendar:** What day is 20 days from Wednesday? — B3
7:58 **Mathnet–Case of the Map with a Gap–5** — C1 C2 G4 G6

WEEK SEVEN

SHOW NUMBER 231

7:31 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6
6:07 **Dirk Niblick: Do Not Fold, Spindle–1:** 3 60-minute tapes vs. 2 90-minute tapes — B5
:20 **Area:** Determine area of rectangular figure — C1 C2
2:45 **Dirk Niblick: Do Not Fold, Spindle–2**
1:43 **Mathman:** Solutions to $T + 40 < 75$ — A4 B1 D1 D4
8:44 **Mathnet: Case of the Willing Parrot–1** — C2 D2 G4

SHOW NUMBER 232

3:41 **Combo Jombo:** Combinatorics — B1 E1
1:33 **Dirklet–Make a Drawing:** Problem-solving heuristic
1:10 **Data Headache I:** Using a bar chart — F6
5:27 **Square One Squares:** Game of mathematical misconceptions
:24 **Polyhedrons–1:** Illustrating a tetrahedron — G6 G1 G2
2:04 **Blackstone–Dime, Penny, Nickel:** Trick based on odd and even numbers — B3 B1
:41 **Infinity (Infinite Regress):** Dynamic suggestion of infinite regress — D1 G2
12:06 **Mathnet: Case of the Willing Parrot–2** — A5 D2 F1 F4 G6

SHOW NUMBER 233 Minor emphasis: Fibonacci Sequence

1:01 **Dirklet: Close Call Promo/Estimation** — B4
4:20 **Ghost of a Chance:** Probability in several situations — F1 F3
5:45 **Close Call:** Estimation game — A5 C1 C2 C3
1:32 **Mathman:** Solutions to $20 > A + 5$ — A4 B1 D1 D4
:28 **Polyhedrons–2:** Illustrating a cube, a hexahedron — G6 G1 G2

PROGRAM GUIDE

Length ▸ Title and Description ▸ Content Areas

2:08 **Phoner–Fibonacci Sequence:** Fibonacci sequence trick — B3 D2

12:13 **Mathnet: Case of the Willing Parrot–2** — B3 G6

SHOW NUMBER 234

5:53 **Dirk Niblick: Go West Young Math–1:** Redistribution of land is necessary — C2 D2

1:13 **Tessellation Animation–Tile:** Tessellation leads to a tile design — G3 G6

3:10 **Dirk Niblick: Go West Young Math–2**

:27 **Mathman:** Extra Short

:25 **Stick Squares I:** Divide a square into square units — G6

4:32 **Sugar Ray Sketch:** Weighing a dog — C2 B1

:42 **Stick Squares II:** Divide a square into square units — G6

11:03 **Mathnet: Case of the Willing Parrot–4** — B3

SHOW NUMBER 235

3:14 **One Billion Is Big:** Relative sizes of million and billion — A1 A2

:47 **Dirklet: Triple Play Promo/Triangles** — G6

:19 **Pong Game:** Billiard geometry — G2 G6

6:15 **Triple Play:** Geometric strategy game — B1 G6

1:39 **Mathman–Square Numbers:** Square numbers — B2

:48 **Square One Puzzler–Salary:** Which is more, .5 or .25? — A3 A4 D1

1:07 **The Sale:** Finding percent from a discount — A5 B1 A3

11:58 **Mathnet: Case of the Willing Parrot–2** — B1 B3 D2

2:00 **Closing**

WEEK EIGHT

SHOW NUMBER 236

1:29 **Mathman:** Solutions to $19-C<5$ — B1 D1 D4

6:37 **Triple Play–Playoff:** Geometric strategy game — B1 G6

6:06 **Dirk Niblick: Mall or Nothing at Mall–1:** Biased survey leads to problems — A5 F5

3:03 **Blackstone–Miraskill-Candies:** Trick based on even numbers — B3 A2

2:38 **Dirk Niblick: Mall or Nothing at Mall–2**

1:08 **Person on the Street–Combinatorics:** Define combinations — E

:30 **Pos vs. Neg Jousts–The Abyss:** Adding positive and negative numbers — A6 B1

Length ▸ Title and Description ▸ Content Areas

5:43 **Mathnet: Case of the Great Car Robbery–1** — A5 B4 F5 F6

SHOW NUMBER 237

3:42 **Prime Numbers:** Song about prime numbers — B2 B3

7:05 **Close Call:** Estimation game — C1

1:46 **Dirklet–Look for a Pattern:** Problem-solving heuristic — D2

1:30 **Mathman:** Solutions to $7 + P < 7$ — A6 B1 D1 D4

2:25 **Percents:** Equivalent fractions/decimals/percents — A5 A3 A4

10:39 **Mathnet: Case of the Great Car Robbery–2** — A5 B4 F2 F5 F6

SHOW NUMBER 238

7:36 **Square One Squares:** Game of mathematical misconceptions

5:36 **Dirk Niblick: Itty Bitty Business–1:** Misplaced decimal points cause problems — A4 A5

1:30 **OOPS! 804 – 236:** Borrowing mistake in subtraction — B1 A2

2:59 **Dirk Niblick: Itty Bitty Business–2**

9:39 **Mathnet: Case of the Great Car Robbery–3** — B5 F5 F6

SHOW NUMBER 239 Major emphasis: Data Presentation

3:10 **Ice Cream Store–Calories:** Bar chart and percents — A5 A3 D1 F6

3:12 **Tessellations:** Tessellations on the beach — G3 G6

1:40 **Dirklet–Divisible by 3:** Divisibility test for 3 — B1

5:48 **Piece of the Pie:** Game of data representation — A5 B1 D1 F6

:13 **Mixed Numbers 3/2:** Graphic depiction of mixed numbers — A3 D1

1:10 **Data Headache III:** Using a broken line graph — F6

1:17 **Mathman:** Percentages more than $\frac{1}{2}$ — A5 D1

10:31 **Mathnet: Case of the Great Car Robbery–4** — B1 B4 B5 F6

SHOW NUMBER 240

1:31 **Dirklet: Compare Fractions ($\frac{1}{3}$, $\frac{1}{4}$)** — A3 D1

4:40 **Blackstone–5-Envelope Spelling:** Tricks based on remainders — D2

2:56 **Archimedes:** Inventions and discoveries of Archimedes

1:37 **Mathman:** Fractions greater than 1 — A3

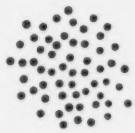
15:24 **Mathnet: Case of the Great Car Robbery–5** — B4 B5 F2 F5 F6

2:00 **Closing**

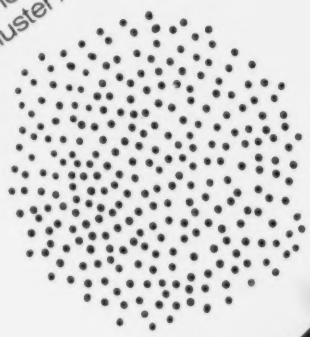
NAME: _____

DATE: _____

IF there are 58 dots in this cluster...

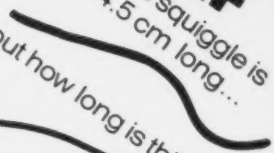


about how many dots are in this cluster?



A. ESTIMATE: _____

IF this squiggle is 4.5 cm long...



about how long is this spiral?

B. ESTIMATE: _____

CLOSE CALL

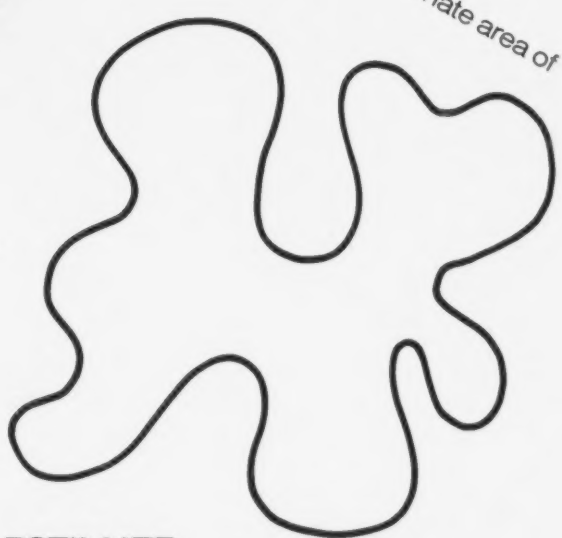
IF this line segment is 1 cm long...

about how long is this?

C. ESTIMATE: _____

IF the area of this small blob is 2.7 sq. cm...

what is the approximate area of this blob?



D. ESTIMATE: _____

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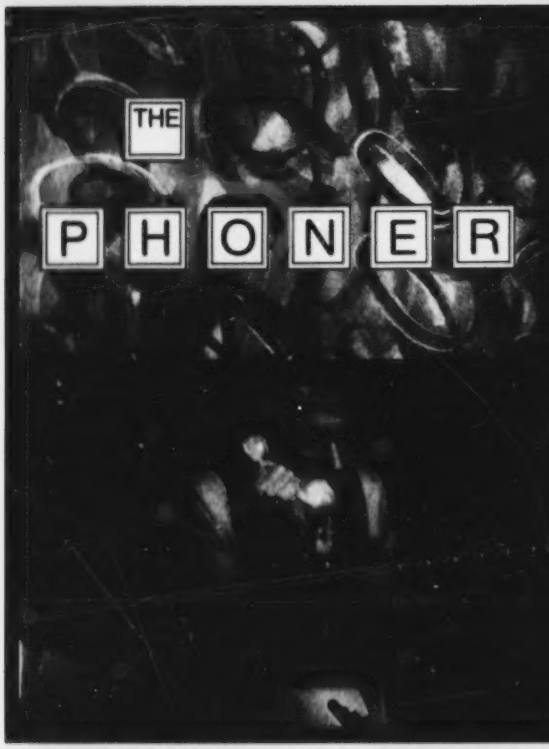

IN BRIEF:

Did you know that you can go through a sequence of mathematical operations that will give you the same result every time, regardless of what number you start with? No, we're not playing games with you. "The Phoner" does exactly that. "Phoner" segments can help students understand how such sequences work.

RULES:

How does the Phoner work? Mysteriously. He never identifies himself. He simply calls a cast member and dictates a set of directions: Pick a number; add five; double it; subtract four; divide by two; subtract the original number. The answer is always three!

And that's only one of the Phoner's tricks. In functions, there are lots of possibilities. There's a sequence that will always yield an answer of two; there's another sequence for which the answer is always six. Make up your own Phoner routines. Can you make up one where the answer is always $\frac{1}{2}$? Who knows where the possibilities end? Only one thing is certain—the Phoner is always right.

STEP-BY-STEP ACTIVITY:

What you need: copies of the activity page.

What to do: **1.** Watch a few episodes of "The Phoner" with your class. The episode in shows 101 and 214 is particularly suitable for the activity which follows.

2. Test the Phoner's routine several times with the whole class. Have individual students suggest different starting numbers and do these computations together:

Pick a number
Add 5
Multiply by 2
Subtract 4
Divide by 2
Subtract the original number.

If your students are really ambitious, have them start with a fraction, a decimal, or even a negative number. The activity will convince them that the answer is always 3.

3. Distribute copies of the activity page and have the class work on Phoner #1. How are the rules for this routine different from those of the original one you tried? And how is the answer different?

4. Students should each pick their own number to add in the second step of Phoner #2. Have each student complete the chart, and then compare results as a class. How are the answers related to the numbers each student chose to add?

5. Have the class pick new numbers and complete Phoner #3. Notice that in the fourth step students are asked to subtract 6 instead of 4. How are the answers *now* related to the numbers each student chose to add?

6. In Phoner #4 students should pick the numbers for both step 2 and step 4. Use a chart like the one below to keep track of the results as a class. What do you notice?

Example

	Original Phoner	Phoner #1	Student #1	Student #2
Step 2	5	7		
Step 4	4	4		
Answer is always	3	5		

Follow-up: Make up a Phoner routine in which the answer is always 10. Make up two others in which the answer is always 10. Make up a Phoner in which the answer is always -2. Make up a Phoner in which the answer is always $\frac{1}{2}$.

NAME: _____

DATE: _____

THE PHONER

1

PICK A NUMBER	4				
ADD 7		15			
DOUBLE IT			16		
SUBTRACT 4				14	
DIVIDE BY 2					11
SUBTRACT THE ORIGINAL NUMBER					

ABC 2

PICK A NUMBER	2				
ADD ☐					
DOUBLE IT					
SUBTRACT 4					
DIVIDE BY 2					
SUBTRACT THE ORIGINAL NUMBER					

DEF 3

PICK A NUMBER	4				
ADD ☐					
DOUBLE IT					
SUBTRACT 6					
DIVIDE BY 2					
SUBTRACT THE ORIGINAL NUMBER					

GHI 4

PICK A NUMBER	3				
ADD ☐					
DOUBLE IT					
SUBTRACT △					
DIVIDE BY 2					
SUBTRACT THE ORIGINAL NUMBER					

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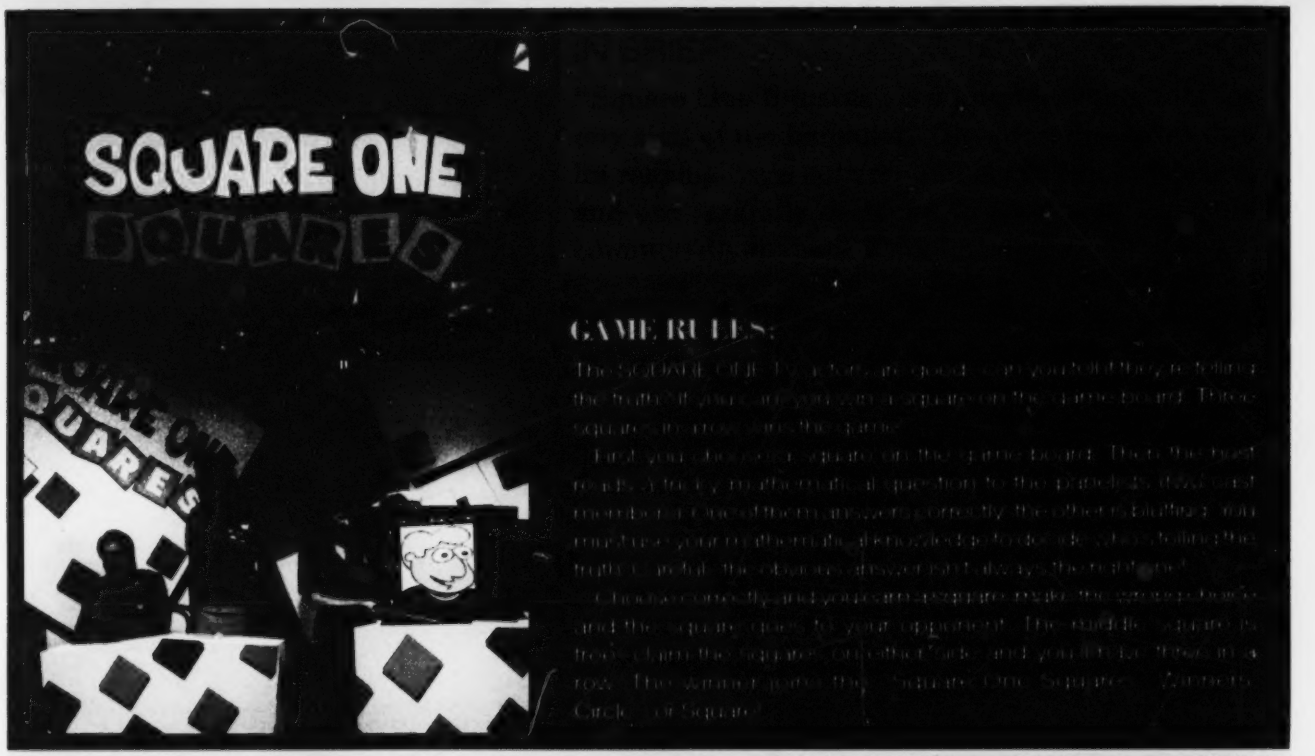


STEP-BY-STEP ACTIVITY:

Several of the problems on "Square One Squares" involve folding up cardboard shapes into boxes. The following activity will give your students practice in thinking these sorts of problems through.

What you need: copies of the activity page, scissors.

What to do: 1. Watch a couple of games of "Square One Squares" with your class--the game in show 207 will be particularly helpful for the activity below. Then distribute copies of the reproducible activity page. Each student should receive two copies: one for cutting out shapes, and one for recording results.

2. On the page are nine two-dimensional shapes, called *nets*. Have students cut out Net 1. They should be able to see that it can be folded up into the three-dimensional Solid A. Have them write "A" in the blank next to Net 1.

3. Solid A and Solid B can each be constructed by folding up some of the numbered nets. However, some of the nets can't be folded into either of the solids. Have students decide which nets match solids and which don't, and then mark the blank next to each net "A," "B," or "X" (if it doesn't match). They should try to figure out the answers before they cut out the nets. Two useful hints:

- Check to see that the triangle in the net matches the triangular face in the solid figure.
- Look at the shapes attached to each side of the triangle in the net. Do these shapes match the ones around the triangular face in the solid figure?

Follow-up: Solid A has 3 faces which look like this:

3 faces which look like this:

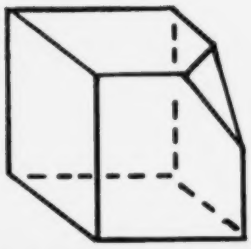
and one face which looks like this.

As an ongoing activity, have students make cutouts of these shapes and find different ways they can be assembled to fold up into Solid A. (We suggest that you limit students to making nets with the four vertical faces in a row, as shown in Nets 1 and 6 on the activity page.) Nets that work can be drawn on graph paper and posted on a bulletin board.

NAME: _____

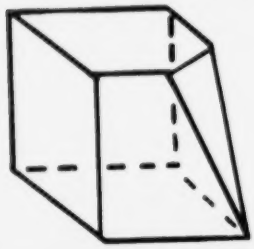
DATE: _____

SQUARE ONE SQUARES

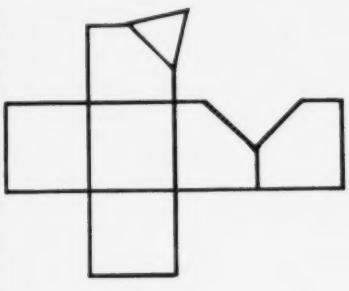


SOLID A

SOLID B



1 ___



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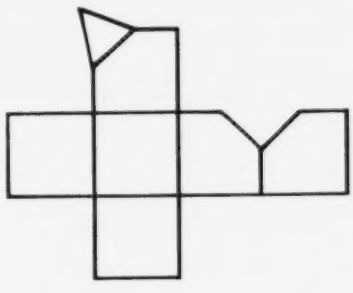

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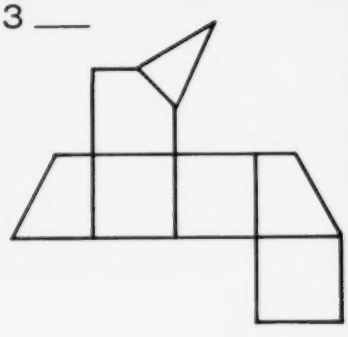

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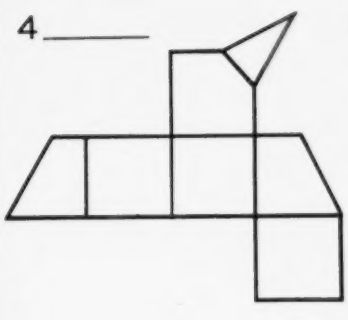

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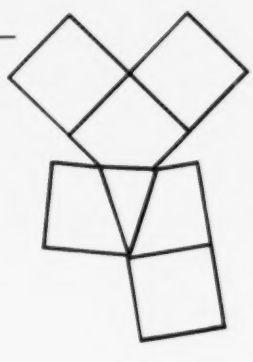

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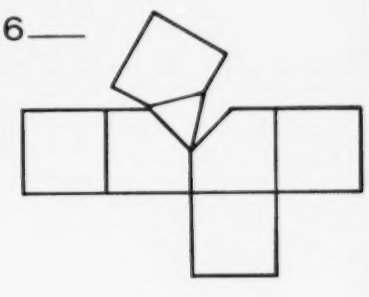

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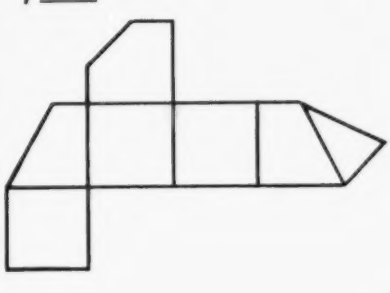

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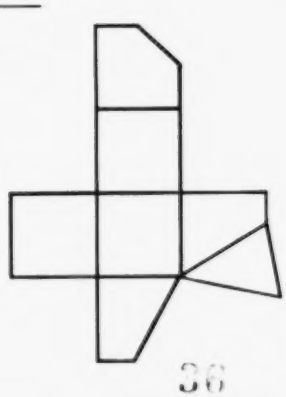

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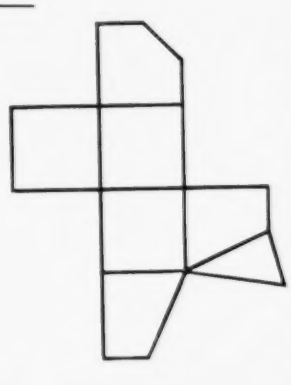

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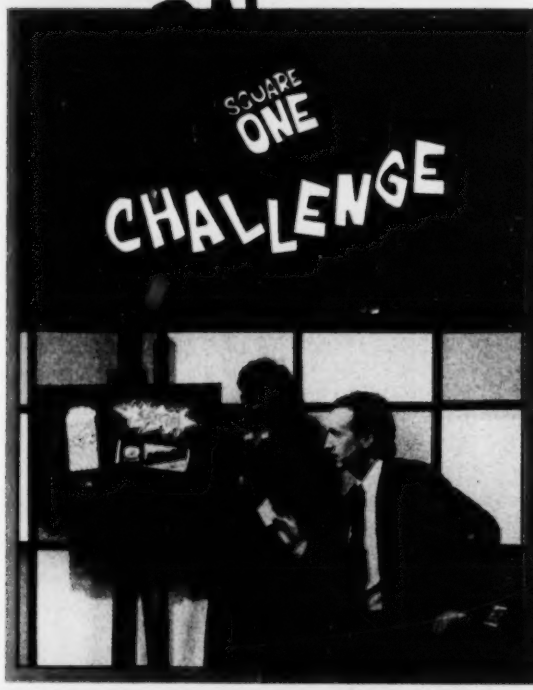


TRY THE SQUARE ONE CHALLENGE

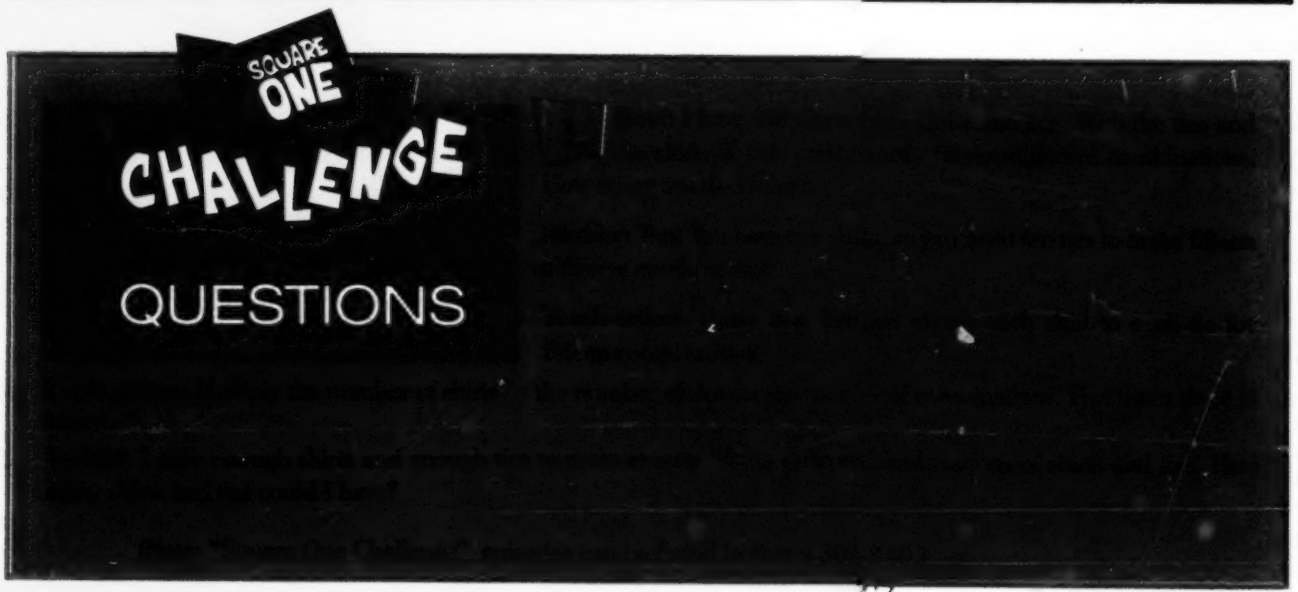
If you want to really challenge your class, try this twist on "Square One Squares." It's called "Square One Challenge," and here's how it works.

ACTIVITY IDEAS:

Listed below are some of the questions from "Square One Squares" and "Square One Challenge," along with the panelists' answers. Here are some suggestions on using them to play the games in class.

1. Ask your students to try answering the questions themselves, before you give them the panelists' answers. Encourage them to create justifications for their answers. These will help you to pinpoint the sources of some of their mathematical misconceptions. The "Square One Challenge" format also provides the opportunity to show that sometimes a problem may have more than one correct answer!

2. Each question listed also includes a variant. Divide your class into groups of three or four and help each group come up with its own variation on a "Square One Squares" or "Square One Challenge" question. By changing some of the numbers in a question, they can adjust it to be as challenging as they choose.



QUESTIONS

2. Host: Benny's House of Junk Food is offering this great deal: a jumbo box of popcorn and an all-night piece of gum for only fifty cents total. One of these items costs ten cents more than the other. How much could the popcorn cost by itself?

Truth teller #1: I think thirty cents, since thirty minus twenty is ten.

Truth teller #2: I think twenty cents—twenty plus thirty is fifty.

Explanation: The popcorn could cost either twenty cents or thirty cents. As long as the difference between the cost of the popcorn and the cost of the gum is ten cents, it doesn't matter which costs more.

Variant: A radio and a clock together cost $100. One costs $3 more than the other one. How much could each cost?

3.

4. Host: This three-by-three-by-three cube is built out of blocks. The cube is painted orange on the outside. How many of the blocks have orange paint on them?

Bluffer: The cube is three blocks by three blocks by three blocks—that's twenty-seven blocks.

Truth teller: I say twenty-six.

Explanation: Not all the blocks have paint on them—the one in the center doesn't. Twenty-seven minus one is twenty-six.

Variant: If you started with a 10 x 10 x 10 cube and painted the outside, how many blocks would be left unpainted?

SQUARE ONE SQUARES QUESTIONS

Host: I have here two pickle pies of exactly the same size. If I cut one pie into fifths and the other pie into sixths, which pie would have larger slices?

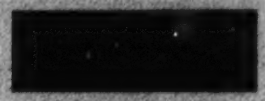
Bluffer: The pie cut into sixths would have larger slices—six is a larger number than five.

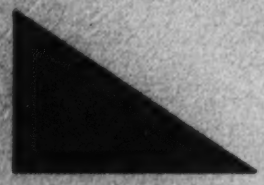
Truth teller: The pie cut into fifths would have larger slices. One sixth is less than one fifth.

Explanation: One sixth is indeed less than one fifth. Because the pie cut into sixths has more slices, each slice must be smaller. (From show 227.)

Variant: What if the pies were cut into sixths and twelfths? One-hundredths and one-thousandths? What if they were pepper pies or pizza pies?

Host: Look at figures A and B. Does B have a greater area than A?

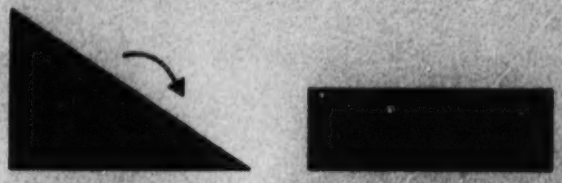
A. 

B. 

Bluffer: Figure B has the greater area.

Truth teller: I think their areas are the same.

Explanation: The areas are the same. There's a simple way to check this--just imagine swinging the top portion of figure B down so that it makes a figure of the same height as figure A. As you'll see, the areas of the two figures are equal. (From show 201.)



Variant: What if the figures were these? Which has the greater area?

Host: I tossed a fair coin ten times in a row and it came up heads each time. If I flip it again, which is more likely to come up, heads or tails?

Bluffer: Tails is more likely. You've had too many heads in a row.

Truth teller: Neither. Heads is as likely as tails.

Explanation: Heads is as likely as tails. With a fair coin, the probability of tossing tails is one-half on any flip. (From show 227.)

Variant: If I roll a die, and on the first five rolls, I get 1, 2, 3, 4, and 5 (in that order), what am I likely to get on the sixth roll?

Host: I have to go to the dentist sixty days from now. If today is a Monday, what day of the week will it be sixty days from now?

Bluffer: Sixty days is exactly two months, so in sixty days it will be a Monday again.

Truth teller: Every seventh day is a Monday. Sixty days from Monday is a Friday.

Explanation: There are seven days in a week, so every seventh day is a Monday. Seven times eight is fifty-six--the fifty-sixth day will be a Monday. Count ahead four days to the sixtieth day--it's Friday. (From show 238.)

Variant: If today is Sunday, how many days away is the first Sunday that's more than 500 days from today?

Host: How many squares are in this grid?

Bluffer: Nine.

Truth teller: Fourteen.

Explanation: There are nine one-by-one squares, four two-by-two squares, and one big three-by-three square. That makes a total of fourteen. (From show 207.)

Variant: How many *rectangles* are in the grid? How many squares are there in a 10 x 10 square grid?

CURRICULUM GOALS

SQUARE ONE TV has three goals. For your convenience, GOAL III, which covers mathematical content areas, is written in outline form. Wherever you see a notation like "D3" or "F4" in the Program Listing, the reference is to this outline.

GOAL I. To promote positive attitudes toward and enthusiasm for mathematics by showing:

- **A.** Mathematics is a powerful and widely applicable tool useful to solve problems, to illustrate concepts, and to increase efficiency.
- **B.** Mathematics is beautiful and aesthetically pleasing.
- **C.** Mathematics can be understood, used, and even invented by nonspecialists.

GOAL II. To encourage the use and application of problem-solving processes by modeling:

- **A. Problem Formulation**
  1. Recognize and state a problem.
  2. Assess the value of solving a problem.
  3. Assess the possibility of solving a problem.
- **B. Problem Treatment**
  1. Recall information.
  2. Estimate or approximate.
  3. Measure, gather data, or check resources.
  4. Calculate or manipulate (mentally or physically).
  5. Consider probabilities.
  6. Use trial-and-error or guess-and-check.
- **C. Problem-Solving Heuristics**
  1. Represent problem: scale model, drawing, map; pictures; diagram, gadget; table, chart; graph; use object, act out.
  2. Transform problem: reword, clarify; simplify; find subgoals, subproblems, work backwards.
  3. Look for: patterns; missing information (pertinent or extraneous).
  4. Reapproach problem: change point of view, reevaluate assumptions; generate new hypotheses.
- **D. Problem Follow-up**
  1. Discuss reasonableness of results and precision of results.
  2. Look for alternative solutions.
  3. Look for alternative ways to solve.
  4. Look for, or extend to, related problems.

GOAL III. To present sound mathematical content in an interesting, accessible, and meaningful manner by exploring:

- **A. Numbers and Counting**
  1. Whole numbers.
  2. Numeration: role and meaning of digits in whole numbers (place value); Roman numerals; palindromes; other bases.
  3. Rational numbers: interpretations of fractions as numbers, ratios, parts of a whole or of a set.
  4. Decimal notation: role and meaning of digits in decimal numeration.
  5. Percents: uses; link to decimals and fractions.
  6. Negative numbers: uses; relation to subtraction.

B. Arithmetic of Rational Numbers

1. Basic operations: addition, subtraction, division, multiplication, exponentiation; when and how to use operations.
2. Structure: primes, factors, and multiples.
3. Number theory: modular arithmetic (including parity); Diophantine equations; Fibonacci sequence; Pascal's triangle.
4. Approximation: rounding; bounds; approximate calculation; interpolation and extrapolation; estimation.
5. Ratios: use of ratios, rates, and proportions; relation to division; golden section.

C. Measurement

1. Units: systems (English, metric, nonstandard); importance of standard units.
2. Spatial: length, area, volume, perimeter, and surface area.
3. Approximate nature: exact versus approximate, i.e., counting versus measuring; calculation with approximations; margin of error; propagation of error; estimation.
4. Additivity.

D. Numerical Functions and Relations

1. Relations: order, inequalities, subset relations, additivity, infinite sets.
2. Functions: linear, quadratic, exponential; rules, patterns.
3. Equations: solution techniques (e.g., manipulation, guess-and-test); missing addend and factor; relation to construction of numbers.
4. Formulas: interpretation and evaluation; algebra as generalized arithmetic.

E. Combinatorics and Counting Techniques

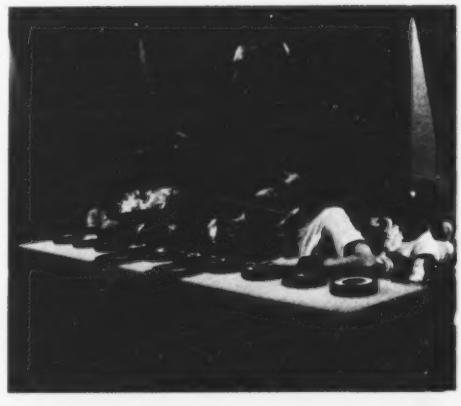
1. Multiplication principle and decomposition.
2. Pigeonhole principle.
3. Systematic enumeration of cases.

F. Statistics and Probability

1. Basic quantification: counting, representation by rational numbers.
2. Derived measures: average, median, range.
3. Concepts: independence, correlation; "Law of Averages."
4. Prediction: relation to probability.
5. Data processing: collection and analysis.
6. Data presentation: graphs, charts, tables; construction and interpretation.

G. Geometry

1. Dimensionality: one, two, three, and four dimensions.
2. Rigid transformations: transformations in two and three dimensions; rotations, reflections, and translations; symmetry.
3. Tessellations: covering the plane and bounded regions; kaleidoscopes; role of symmetry; other surfaces.
4. Maps and models in scale: application of ratios.
5. Perspective: rudiments of drawing in perspective; representation of three-dimensional objects in two dimensions.
6. Geometrical objects: recognition; relations among; constructions; patterns.
7. Topological mappings and properties: invariants.



ANSWER KEY

"But Who's Counting?"

Step 1: The probability of NOT getting a 9 in four tries is $(9/10)^4$ so the probability of GETTING at least one 9 in four tries is $1 - (9/10)^4 = .3439$. Therefore, if an 8 comes up first, you should put it in the ten thousands' place.

Step 4: Strategy A is the better strategy.

90 09	91 19	92 29	93 39	94 49	59 59	69 69	79 79	89 89	99 99
80 08	81 18	82 28	83 38	84 48	58 58	68 68	78 78	88 88	98 98
70 07	71 17	72 27	73 37	74 47	57 57	67 67	77 77	87 87	97 97
60 06	61 16	62 26	63 36	64 46	56 56	66 66	76 76	86 86	96 96
50 05	51 15	52 25	53 35	54 45	55 55	65 65	75 75	85 85	95 95
40 04	41 14	42 24	43 34	44 44	54 54	64 64	74 74	84 84	94 94
30 03	31 13	32 23	33 33	34	53 53	63 63	73 73	83 83	93 93
20 02	21 12	22 22	23	24	52 52	62 62	72 72	82 82	92 92
10 01	11 11	12	13	14	51 51	61 61	71 71	81 81	91 91
00 00	01	02	03	04	50 50	60 60	70 70	80 80	90 90

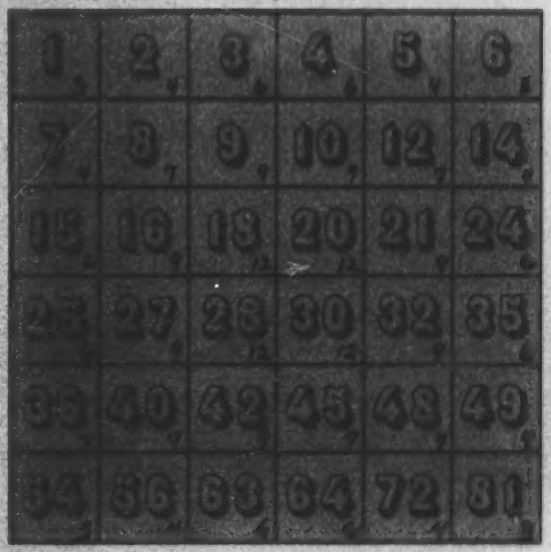
Follow-up: The third strategy is identical to strategy A except in cases where the first spin is a 4. In that situation, strategy A would result in a win as long as the second spin was 5 or more. Strategy A is still to be preferred. If you are only playing with even numbers, then you should put the first digit in the tens' place if it's 6 or 8, in the ones' place if it's 2 or 0, and if it's 4, you can put it in either place. If you're trying to make the largest *three*-digit number, put the first digit in the hundreds' place if it's 7, 8, or 9. If it's 3, 4, 5, or 6, put it in the tens' place. If it's 0, 1, or 2, put it in the ones' place. For the second spin, follow the same strategy you would to make the largest *two*-digit number.

"But Who's Multiplying?"

Step 2: The game board was designed to include only those numbers which are the product of two numbers from the factor board. Therefore 11 and 13, as well as many other numbers, were left out. The only primes which appear are 2, 3, 5, and 7.

Step 3: The square containing the product 18 is included in 12 possible three-in-a-rows, but there are only three possible three-in-a-rows which contain the product 6. The square containing 18 seems like a better place to start, because it gives you more potential ways to win.

Step 4: Squares near the center of the game board are part of more three-in-a-rows than squares near the edges. Therefore, squares near the center of the board could be considered better places to start.



Follow-up:

		RED RING	BLUE RING	PRODUCT
IF	RED PLAYS	5	4	20
AND	BLUE PLAYS		1	5

...Then Red has 12 possible ways to win, and Blue has only 4.

		RED RING	BLUE RING	PRODUCT
IF	RED PLAYS	5	4	20
AND	BLUE PLAYS		8	40

...Then Red has 11 possible ways to win, and Blue has 6.

ANSWER KEY

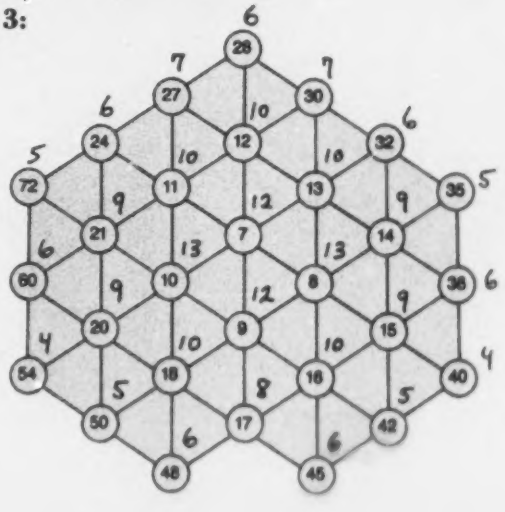
IF	RED RING	BLUE RING	PRODUCT
RED PLAYS	5	4	20
AND BLUE PLAYS	*	2	10

...Then Red has 10 possible ways to win, and Blue has 7.

"Triple Play"

Step 2: It is to your advantage to claim positions that are vertices of many equilateral triangles. In this case, 10 is the vertex of 13 triangles, while 24 is the vertex of only six, and 54 is the vertex of only four.

Step 3:



Step 4: The numbers of triangles down the middle line are all even because the middle line is an axis of symmetry. For example, if 7 is the vertex of a triangle to the left of the middle line, it is also the vertex of a corresponding triangle to the right of the middle line.

Follow-up 1: The best starting positions on the board are probably 10 and 8. Each is a vertex of 13 triangles.

b: If you get 10 and 1 it is better to multiply because 10 is a vertex of 13 triangles while 11 is only a vertex of 10. If your opponent rolls 7 and 1 and claims 8, which is a vertex of 13 triangles, he doesn't block any of the 13 which have 10 as a vertex. If he multiplies and claims 7, then he'll have 10 potential equilateral triangles, and will have reduced your 13 potential triangles to 11.

If your opponent rolls 3 and 8:

- 24 is the vertex of six triangles and doesn't block any of the 13 triangles with 10 as a vertex
- 11 is the vertex of 10 triangles and blocks two of the 13 triangles with 10 as a vertex

If your opponent rolls 9 and 4:

- 36 is the vertex of six triangles and doesn't block any of the 13 triangles with 10 as a vertex
- 13 is the vertex of 10 triangles and blocks two of the 13 triangles that have 10 as a vertex

Follow-up 2: The total number of triangles on the game board is 76.

"Close Call"

Step 2:
A. There are approximately 275 dots in the larger cluster.
B. The spiral is approximately 75 cm long.
C. The curve is approximately 90 cm long.
D. The larger blob is approximately 30 sq. cm in area. (Students' answers may vary.)

"The Phoner"

Step 3: In the second step you add 7 instead of 5; and the answer is always 5 instead of 3.

PICK A NUMBER	4	8	1	2	6
ADD 7	11	15	8	9	13
DOUBLE IT	22	30	16	18	26
SUBTRACT 4	18	26	12	14	22
DIVIDE BY 2	9	13	6	7	11
SUBTRACT THE ORIGINAL NUMBER	5	5	5	5	5

Step 4: The answer should always be 2 less than whatever number the student chose to add in step 2.

Step 5: Now the answer should always be 3 less than whatever number the student chose to add in step 2.

"Square One Squares"

Net 1. A **Net 2.** X **Net 3.** X **Net 4.** B
Net 5. B **Net 6.** A **Net 7.** X **Net 8.** B
Net 9. B